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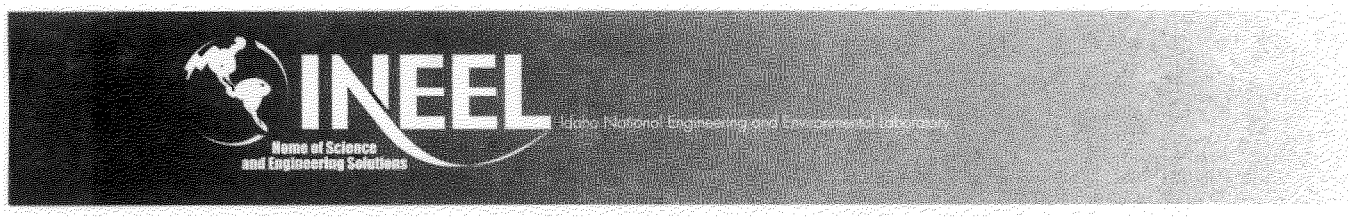
Idaho Operations Office

Waste Acceptance Criteria for ICDF Evaporation Pond



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Prepared for the
U.S. Department of Energy
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ABSTRACT

The INEEL CERCLA Disposal Facility evaporation pond will accept Comprehensive Environmental Response, Compensation, and Liability Act wastes generated within the Idaho National Engineering and Environmental Laboratory. Hazardous, mixed, and low-level, wastes will be accepted for disposal at the INEEL CERCLA Disposal Facility evaporation pond. The purpose of this Waste Acceptance Criteria document is to provide the basis for the quantities of radioactive and non-radioactive wastes allowable in waste designated for disposal in the INEEL CERCLA Disposal Facility evaporation pond.

The evaporation pond is designated as a Corrective Action Management Unit in accordance with the substantive requirements of IDAPA 58.01.05.008 (40 CFR 264.552). The evaporation pond is designed to meet 40 CFR 264 Subpart K and CC for the purposes of managing INEEL CERCLA Disposal Facility landfill leachate, other aqueous wastes including well purge/development water, and from operations of the INEEL CERCLA Disposal Facility Complex (Operable Unit 3-13 Record of Decision).

The INEEL CERCLA Disposal Facility Complex Waste Acceptance Criteria defines the overall operational responsibilities. The purpose of this evaporation pond Waste Acceptance Criteria is to provide the basis for the quantities of radioactive and non-radioactive contaminants that may be present in the aqueous wastes disposed in the INEEL CERCLA Disposal Facility evaporation pond. The aqueous wastes will include leachate from the INEEL CERCLA Disposal Facility landfill, purge and development water from monitoring well drilling operations, secondary aqueous wastes generated from waste processing and decontamination activities in the Staging, Storage, Sizing, and Treatment Facility.

Compliance with the requirements of the evaporation pond Waste Acceptance Criteria will ensure protection of human health and the environment. This document provides the regulatory citations used in the development of the evaporation pond aqueous Waste Acceptance Criteria, and the acceptable numerical concentrations for the waste constituents.

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FIGURES

TABLES

ACRONYMS

ALARA	as low as reasonably achievable
AOC	area of concern
ARAR	applicable or relevant and appropriate requirement
CAMU	Corrective Action Management Unit
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
DOE	U.S. Department of Energy
DOE-ID	Department of Energy, Idaho Operations Office
EDF	Engineering Design File
EPA	Environmental Protection Agency
ER	environmental restoration
HDPE	high-density polyethylene
HWMA	Idaho Hazardous Waste Management Act
ICDF	INEEL CERCLA Disposal Facility
IDAPA	Idaho Administrative Procedures Act
IDW	investigation-derived waste
INEEL	Idaho National Engineering and Environmental Laboratory
INTEC	Idaho Nuclear Technology and Engineering Center
LDR	land disposal restriction
NESHAP	National Emission Standard for Hazardous Air Pollutant
O&M	operation and maintenance
OU	operable unit
PCB	polychlorinated biphenyl
PPE	personal protective equipment
QA	quality assurance

RAOs	remedial action objectives
RCRA	Resource Conservation and Recovery Act
RD	remedial design
RD/CWP	remedial design/construction work plan
RME	reasonably maximally exposed
ROD	record of decision
SLERA	Screening Level Ecological fisk Assessment
SRPA	Snake River Plain Aquifer
SSA	Staging and Storage Annex
SSSTF	Staging, Storage, Sizing, and Treatment Facility
TRA	Test Reactor Area
TRU	transuranic
TSCA	Toxic Substances Control Act
TSS	total suspended solids
UHC	underlying hazardous constituent
VO	volatile organic
WAC	Waste Acceptance Criteria
WAG	waste area group

NOMENCLATURE

The following definitions are presented as an aid to the reader for the understanding of technical and scientific terms used within this document.

Analytical residue and sample preservative residue: Aqueous and organic solutions from sample preservatives and analytical residue generated from field preparation and laboratory analyses.

CERCLA-derived remediation and removal wastes: Wastes from Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) activities that may include, but are not limited to, soil, water, debris, contaminated personal protective equipment (PPE), filters, and other support equipment that cannot be decontaminated.

Construction wastes: Wastes generated during the on-site construction of CERCLA activities

Contaminated equipment: Contaminated equipment becomes a waste stream if it cannot be properly decontaminated or reused.

Debris: Solid material exceeding a 60-millimeter (mm) particle size that is a manufactured object, plant, or animal matter, or natural geologic material intended for disposal. However, the following materials are not considered to be debris:

- Any material for which a specific treatment standard is provided in Subpart D of 40 Code of Federal Regulations 268, such as lead acid batteries, cadmium batteries, and radioactive lead solids
- Process residuals, such as smelter slag and residues from the treatment of waste, wastewater, sludge, or air emission residues
- Intact containers of hazardous waste that retain at least 75% of their original volume.
- A mixture of debris and other material that has not been treated to the standards provided by 40 Code of Federal Regulations 268.45 is subject to regulation as debris, if the mixture is composed primarily of debris, by volume, based on visual inspection.

Drill cuttings: Soil generated from boring and drilling activities. Perched water and Snake River Plain Aquifer (SRPA) water well installation is expected to generate a substantial volume of drill cuttings.

Free liquids: Liquids that can be readily separated from the solid portion of a waste under ambient temperature and pressure (DOE Order 435.1), as demonstrated by "Environmental Protection Agency Paint Filter Liquids Test Method 9095."

Hazardous debris: Debris that contains a hazardous waste listed in Subpart D of 40 Code of Federal Regulations 261, or that exhibits a characteristic of hazardous waste identified in Subpart C of 40 Code of Federal Regulations 261.

Hazard index: The sum of more than one hazard quotient where the Environmental Protection Agency (EPA) goal is a value not to exceed 1.

Hazard quotient: The ratio of a single substance exposure level, over a given time period, to a reference exposure level at which no adverse effects are likely to occur.

Hazardous substances: Any material designated as such pursuant to CERCLA, including all Resource Conservation and Recovery Act (RCRA) hazardous wastes, radionuclides, a variety of other chemical substances, and any material identified as a hazardous substance, such as petroleum, petroleum products, and all hazardous wastes.

Hazardous waste: Waste designated as hazardous by EPA regulations (40 Code of Federal Regulations 261.3) and regulated under RCRA.

High-level waste: Highly radioactive waste material. High-level waste results from the reprocessing of spent nuclear fuel, including the liquid waste produced directly during reprocessing. As per DOE Order 435.1, the term refers to any solid material derived from such liquid waste that contains fission products in sufficient concentrations, and to other highly radioactive material that is determined, consistent with existing law, to require permanent isolation. (Adapted from: Nuclear Waste Policy Act of 1982, as amended.)

Hydraulic spills: Unintentional releases of hydraulic fluid. Spills that occur when hydraulic fluid leaks from equipment seals or through ruptured hoses.

Investigation-derived waste: Materials that are generated from CERCLA investigations, such as drill cuttings, purge water, development water, overburden, interstitial and underburden soils, and wastes (debris, sludge, etc.).

Infectious waste: Waste containing living organisms that could endanger human health or the health of domestic animals or wildlife by extending the range of biological pests, viruses, pathogenic microorganisms, or other agents capable of infesting, infecting, or extensively and permanently altering the normal populations of organisms.

Low-level radioactive waste: Waste that cannot be defined as high-level radioactive waste, spent nuclear fuel, transuranic (TRU) waste, by-product material (as defined in Section 11e. [2] of the Atomic Energy Act of 1954, as amended), or naturally occurring radioactive material (DOE Order 435.1).

Miscellaneous waste: Non-recyclable, unwanted material, such as trash, labels, rags, and other debris.

Mixed waste: Waste containing both radioactive components as defined by the Atomic Energy Act of 1954 (as amended), and hazardous components as defined by 40 Code of Federal Regulations 262.

Personal protective equipment: Items worn or used during waste-handling activities such as coveralls, shoe covers, boots, gloves, glove liners, hoods, and duct tape. Coveralls and hoods are generally made of cloth, paper, or synthetic material. Gloves are generally latex or nitrile, and glove liners are made of disposable cloth material. Shoe covers and boots are generally rubber.

Purge/development water: Water generated from well development or during sampling that is removed from a well before samples are collected.

Radioactive waste: Solid, liquid, or gaseous material that contains radionuclides regulated under the Atomic Energy Act of 1954 (as amended), which is of negligible economic value considering costs of recovery.

RCRA Facility means:

1. All contiguous land, structures, other appurtenances, and improvements on the land, used for treating, storing, or disposing of hazardous waste. A facility may consist of several treatment, storage, or disposal operational units (e.g., one or more landfills, surface impoundments, or combinations of them).

2. For the purpose of implementing corrective action under 40 CFR 264.101, all contiguous property under the control of the owner or operator seeking a permit under Subtitle C of RCRA. This definition also applies to facilities implementing corrective action under RCRA Section 30008(h).

3. Notwithstanding paragraph (2) of this definition, a remediation waste management site is not a facility that is subject to 40 CFR 264.101, but is subject to corrective action requirements if the site is located within such a facility.

Sample containers: Vessels composed of steel, aluminum, Teflon, brass, glass, or plastic used to contain samples of water, soil, or other media. Once used, these containers become a waste stream if they cannot be decontaminated for reuse.

Secondary waste: A generic category of wastes that are generated from support activities (including operations and maintenance [O&M] activities) related to retrieving, processing, and packaging the investigation-derived materials. Examples of secondary wastes include waste associated with routine decontamination activities (excluding facility closure), PPE, administrative area and support services wastes, used equipment and filters, and other similar wastes generated during O&M activities.

Soil waste: Soils excavated as part of a project that may be contaminated as a result of spill and pipeline leaks or radioactive liquids from plant liquid transfer operations.

Solidification: A technique that limits the solubility and mobility of hazardous waste constituents through physical means. This process changes the physical state from liquid or semi-solid to a solid.

Spent nuclear fuel: Fuel that has been withdrawn from a nuclear reactor following irradiation and that has not yet been reprocessed to remove its constituent elements.

Stabilization: A technique that limits the solubility and mobility of hazardous waste constituents by causing the constituents to bond or chemically react with the stabilizing material.

Structural stability: A waste form that will generally maintain its physical dimensions and its form under the expected disposal conditions, such as weight of overburden and compaction equipment, the presence of moisture and microbial activity, and internal factors such as radiation effects and chemical changes. The waste form itself can provide structural stability by processing the waste to a stable form or by placing the waste in a disposal container or structure that provides stability after disposal.

Toxic Substances Control Act (TSCA) waste: Waste managed strictly under TSCA regulations Currently, only PCBs and asbestos are regulated under TSCA as waste.

Transuranic waste: Per DOE Order 435.1, radioactive waste containing more than 100 nanocuries (3,700 becquerels) of alpha-emitting TRU isotopes per gram of waste, with half-lives greater than 20 years, except for (1) high-level radioactive waste; (2) waste that the Secretary of Energy has determined, with the concurrence of the administrator of EPA, does not need the degree of isolation required by the 40 Code of Federal Regulations Part 191 disposal regulations; or (3) waste that the Nuclear Regulatory Commission (NRC) has approved for disposal on a case-by-case basis in accordance with 10 Code of Federal Regulations Part 61. (Source: Waste Isolation Pilot Plant Land Withdrawal Act of 1992, as amended.)

Unused and unaltered sample material: Material that may include excess soil cores from the interbeds, underlying basalt, and groundwater.

Void space: *Compressible void spuce:* Space that is compressible through the application of load or settlement over time (for example, interstitial space in soils, empty space in wooden boxes of soils, etc.). *Incompressible void spuce:* Percent of voids in waste that is encased in a cement enclosure (for example, void space within a container that has been filled with concrete).

Waste Acceptance Criteria for ICDF Evaporation Pond

1. INTRODUCTION

The U.S. Department of Energy Idaho Operations Office (DOE-ID) authorized a remedial design/ construction work plan (RD/CWP) for the Idaho Nuclear Technology and Engineering Center (INTEC) in accordance with the Waste Area Group (WAG) 3, Operable Unit (OU) 3-13 Record of Decision (ROD) (DOE-ID 1999).

The OU 3-13 ROD requires Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) remediation wastes generated within the INTEC boundaries to be removed and disposed on-Site in the INEEL CERCLA Disposal Facility (ICDF). The ICDF Complex, which will be located southwest of INTEC, will be an on-Site, engineered facility, meeting DOE Order 435.1, the substantive requirements of Resource Conservation and Recovery Act (RCRA) Subtitle C, Idaho Hazardous Waste Management Act (HWMA), and Toxic Substance Control Act (TSCA) polychlorinated biphenyl (PCB) landfill design and construction requirements. The ICDF Complex will include the necessary subsystems and support facilities to provide a complete waste disposal system. The major components of the ICDF Complex are the disposal cells (landfill), an evaporation pond (comprised of two cells), and the Staging, Storage, Sizing, and Treatment Facility (SSSTF).

Only low-level, mixed low-level, hazardous, and limited quantities of TSCA PCB wastes will be treated and/or disposed at the ICDF Complex. Most of the waste will be contaminated soil, but debris and liquid waste will also be included in the waste inventory.

The ICDF evaporation pond will accept ICDF landfill leachate, aqueous waste streams from ICDF Complex operations, and aqueous waste from WAG 3 and ICDF Complex groundwater monitoring (e.g., purge, sampling, well development, and decontamination water). Aqueous wastes (e.g., groundwater well development, purging, sampling and decontamination activities) generated from "INEEL CERCLA remedial and removal actions that are primarily mixed LLW would be acceptable"for disposal in the ICDF evaporation pond." Activities that meet the definition of support are those which are identified or otherwise listed in a primary or secondary document or in another CERCLA authorized action, as defined in the Federal Facility Agreement and Consent Order including activities that support both CERCLA and non-CERCLA objectives. The ICDF evaporation pond is designated as a Corrective Action Management Unit (CAMU) in the OU 3-13 ROD. The ICDF evaporation pond is designed and constructed to accept leachate from the ICDF landfill.

Three WACs have been developed for the ICDF Complex. These are the ICDF Complex WAC, which is the main WAC for the complex, and two secondary WACs for the ICDF landfill and ICDF evaporation pond, as described below:

1. The *ICDF Complex Waste Acceptance Criteria* (ICDF Complex WAC) (DOE-ID 2002a) is the master WAC for all wastes entering the ICDF Complex for treatment, storage, disposal, or packaging for off-site shipment. All incoming wastes must have adequate documentation to demonstrate that they meet the appropriate WAC for units within the ICDF Complex. If the waste is to be shipped off-site and is brought into the ICDF for repackaging, the waste should meet the WAC for the final disposal facility. The ICDF Complex WAC will allow the waste to enter the

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a. DOEAD-10660, *Final Record of Decision, Idaho Nuclear Technology and Engineering Center, Operable Unit 3-13,* Page A-64, Comment 229.

ICDF Complex, but if the waste is destined for the landfill, evaporation pond, or the treatment unit, the secondary WACs must also be met.

2. The *ICDF Landfill Waste Acceptance Criteria* (ICDF Landfill WAC) (DOE-ID 2002b) is a secondary WAC specific to wastes that will be disposed to the ICDF landfill. Landfill-specific acceptance criteria (e.g., numerical chemical and radiological concentrations) have been developed for the landfill and are included in the landfill WAC. Development of the chemical and radiological acceptance criteria for the landfill included calculations to determine concentrations in the ICDF landfill leachate that are protective of the evaporation pond liner system, Snake River Plain Aquifer (SRPA), and human health and the environment. Generic criteria that must be met by all wastes entering the ICDF Complex gates are referenced to specific sections of the ICDF Complex WAC.

3. This ICDF Evaporation Pond WAC is a secondary WAC specific to wastes that will be treated or disposed to the ICDF evaporation pond. Evaporation pond-specific acceptance criteria (e.g., numerical chemical and radiological concentrations) have been developed for the pond and are included in this WAC. Development of the chemical and radiological acceptance criteria for the landfill included calculations to determine concentrations in the ICDF landfill leachate that are protective of the evaporation pond liner system, human health, and potential ecological receptors. Generic criteria that must be met by all wastes entering the ICDF Complex gates are referenced to specific sections of the ICDF Complex WAC.

1.1 Purpose and Objectives

The purpose of this WAC is to provide the limits for the quantities of radioactive and non-radioactive constituents that may be present in ICDF landfill leachate and other CERCLA-generated aqueous waste for disposal to the ICDF evaporation pond.

The objectives of the ICDF Evaporation Pond WAC are to ensure that:

- The commitments in the OU 3-13 ROD are met and maintained
- The waste received at the ICDF evaporation pond contains only the radionuclides and hazardous constituents that the facility can safely manage.
- The concentrations and/or total activities of the waste received at the ICDF evaporation pond are compatible with the ICDF evaporation pond design and operations.
- Aqueous waste received at the ICDF evaporation pond does not contain materials that will compromise the safety or integrity of the facility under the expected operating conditions.

1.2 Scope

The ICDF evaporation pond is a CAMU designated to accept ICDF landfill leachate. The WAG 3 area of concern (AOC) is shown in Figure 1-1. The decontamination water, water from WAG 3 well purging and sampling, and aqueous wastes generated within the ICDF Complex are acceptable for disposal. Aqueous wastes (e.g., groundwater well development, purging, sampling and decontamination activities) generated from "INEEL CERCLA remedial and removal actions that are primarily mixed LLW would be acceptable (see footnote a) for disposal in the ICDF evaporation pond." Activities that meet the definition of support are those which are identified or otherwise listed in a primary or secondary document or in another CERCLA authorized action, as defined in the Federal Facility Agreement and

Consent Order including activities that support both CERCLA and non-CERCLA objectives. The pump system will track the volume and flow rate of leachate disposed to the pond. The ICDF evaporation pond system consists of two 2,200,000-gallon capacity ponds that will contain leachate generated from the ICDF landfill, as well as additional inflows from other sources including direct precipitation, washdown water for trucks and equipment, and purge/development water. The ponds are lined with a RCRA Subtitle C liner, "Pond Lining System Equivalency Analysis" (EDF-ER-312).

The ICDF Complex users must specify and obtain approval from the ICDF Complex Operations Manager prior to shipment. Aqueous wastes that meet the evaporation pond WAC and can be accepted at the ICDF evaporation pond include:

- ICDF landfill leachate.
- Aqueous wastes generated in the ICDF Complex.
- Secondary aqueous wastes from CERCLA waste processing and decontamination activities in the SSSTF.
- Aqueous wastes (e.g., groundwater well development, purging, sampling and decontamination activities) generated from "INEEL CERCLA remedial and removal actions that are primarily mixed LLW would be acceptable (see footnote a) for disposal in the ICDF evaporation pond." Activities that meet the definition of support are those which are identified or otherwise listed in a primary or secondary document or in another CERCLA authorized action, as defined in the Federal Facility Agreement and Consent Order including activities that support both CERCLA and non-CERCLA objectives.
- Purge and development water from WAG 3 CERCLA monitoring wells.

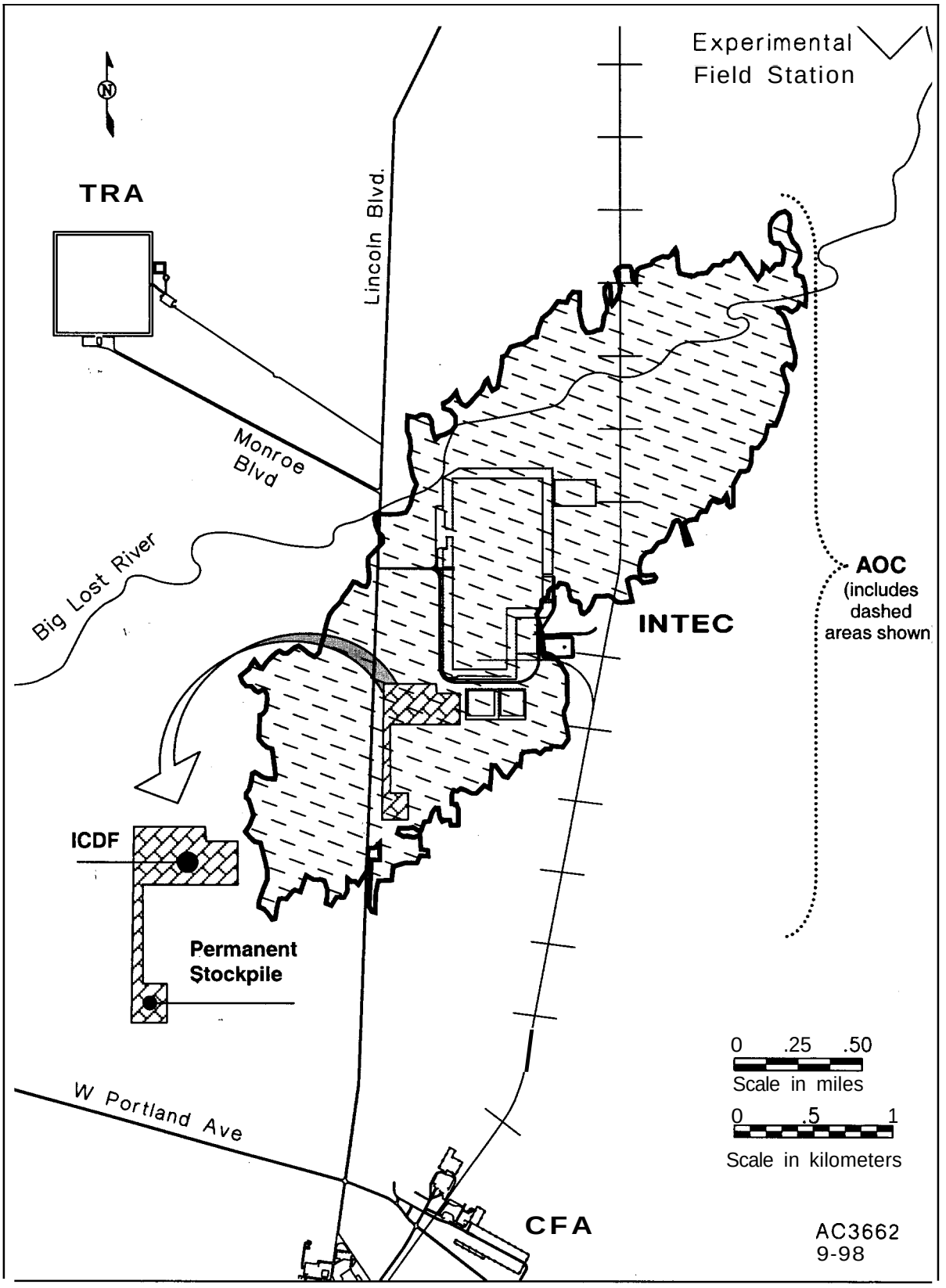

Figure 1-1. **WAG** 3 area of concern **(AOC).**

1.2.1 Waste Streams and Volumes for the Evaporation Pond

The aqueous wastes that will be generated at the ICDF and the INEEL WAGs are as follows:

- **ICDF landfill leachate.** The design and operation of the ICDF landfill will include provisions for leachate monitoring and management. The leachate will be disposed in the ICDF evaporation pond with no treatment. The quantity of leachate will vary with the rate of precipitation and the uncovered surface area of the ICDF landfill.

- **Aqueous wastes generated in the ICDF Complex.** The aqueous wastes generated inside the ICDF will be capable of being sent to the ICDF evaporation pond directly.

- **Secondary aqueous wastes from waste processing and decontamination activities inside the SSSTF and ICDF Complex.** The quantity of aqueous waste generated from decontamination activities is expected to be minimal. It is anticipated that all secondary aqueous wastes generated by decontamination activities will be disposed in the ICDF evaporation pond.

- **Aqueous waste from WAG 3/ICDF Complex groundwater monitoring.** It is estimated that approximately 263,000 gallons of monitoring well purge and development water will be generated prior to the middle of the year 2003 when the ICDF evaporation pond is expected to become operational. This water will be stored in tanks at the Staging and Storage Annex (SSA) until the ICDF evaporation pond is ready to accept it. After the ICDF evaporation pond becomes operational, the peak purge and development water generation rate is estimated to be 35,000 gallons per year (gal/year). The purge water generated prior to the opening of the ICDF evaporation pond will be sampled, analyzed, and profiled prior to disposal.

  Aqueous wastes (e.g., groundwater well development, purging, sampling and decontamination activities) generated from "INEEL CERCLA remedial and removal actions that are primarily mixed LLW would be acceptable (see footnote a) for disposal in the ICDF evaporation pond." Activities that meet the definition of support are those which are identified or otherwise listed in a primary or secondary document or in another CERCLA authorized action, as defined in the Federal Facility Agreement and Consent Order including activities that support both CERCLA and non-CERCLA objectives.

1.2.2 CAMU Designation and Land Disposal Restrictions

The OU 3-13 ROD designates the ICDF evaporation pond as a CAMU for the purpose of receiving leachate from the ICDF landfill. The landfill leachate is an F039 waste. A CAMU is defined as *"an area within a facility that is used only for managing remediation wastes for implementing corrective action or cleanup at the facility"* (40 CFR 260.10). Placement of remediation wastes into or within a CAMU does not constitute land disposal of hazardous wastes (40 CFR 264 Subpart S (a)(1)). The operational philosophy for the evaporation pond will be implemented through the WACs and ICDF Complex Remedial Action Work Plan.

1.3 Roadmap to the Waste Acceptance Criteria

The ICDF Evaporation Pond WAC is a subset of the ICDF Complex WAC (DOE-ID 2002a). Table 1-1 is a cross-reference between the ICDF Complex WAC and this evaporation pond WAC. The primary elements of the ICDF evaporation pond waste acceptance requirements can be found in the following locations:

- Criteria basis is found in Section 4 of this evaporation pond WAC
- WAC is found in Section 5 of this evaporation pond WAC
- Waste content or concentration accepted at the ICDF evaporation pond is found in Section 5 of this evaporation pond WAC
- Prohibitions are found in Section 5-1 of the ICDF Complex WAC (b) and in Section 5.2 of this evaporation pond WAC.

Non-conforming waste is described in Section 3.8 of the ICDF Complex WAC (DOE-ID 2002a)

Table 1-1. Cross-reference of ICDF Complex WAC and Evaporation Pond WAC.

Function	ICDF Complex WAC Section
Responsibilities	1.5
General requirements of the waste profile process	2.1
Exceptions to WAC requirements (case-by-case acceptance)	2.2.1
General classes of waste	2.2
Waste form requirements	2.2
Composition and waste containers	2.3
Physical and chemical characterization requirements	2.4
Type of acceptable knowledge	2.4.1
Radiological characterization	2.5
Waste acceptance process	3
Waste acceptance scheduling requirements	3.2
Waste tracking system	3.3
Data quality objectives	3.4
Waste profile	3.5
Waste certification process	3.6
Verification as packaged	3.7
Receipt verification	3.8
Non-conforming waste	3.9
Records	3.10
Packaging and shipping	3.11
Prohibitions	5.1
Criticality safety limits	5.4.3
Packaging criteria	5.5
Outer package criteria	5.5.1
Container requirements	5.5
Condition of containers	5.5.2
Package labeling and marking	5.5.6

1.4 Relationship to Other Documents

This ICDF Evaporation Pond WAC is based on and integrates with several related documents, as discussed below.

1.4.1 OU 3-13 Record of Decision

The OU 3-13 ROD (DOE-ID 1999) is the regulatory authorization for the ICDF Complex. It includes the regulatory basis for the ICDF landfill, and the applicable or relevant and appropriate requirements (ARARs) that the ICDF Complex must meet. The OU 3-13 ROD designates the ICDF evaporation pond as a CAMU that will be designed and constructed to accept the ICDF leachate and other aqueous wastes generated from the operation of the ICDF Complex.

1.4.2 Related ICDF Complex WACs

Three WACs will be in effect in the ICDF Complex during operation of the landfill. They are briefly described below:

1. **ICDF Complex WAC.** The ICDF Complex WAC (DOE-ID 2002a) will encompass all waste entering the ICDF, including waste for landfill disposal, pond disposal, or for storage or off-Site shipment. Wastes meeting the ICDF Complex WAC must demonstrate that they meet the ICDF Evaporation Pond WAC in order to be accepted for disposal in the ICDF evaporation pond. The wastes must meet the ICDF Landfill WAC to be accepted for disposal to the landfill and must meet the SSSTF WAC to be accepted for treatment. The ICDF Complex WAC contains the WAC components that apply to all wastes incoming to the complex, regardless of the intended final disposal.

2. **ICDF Landfill WAC.** This WAC (DOE-ID 2002b) specifies the requirements for waste that will be disposed in the ICDF landfill.

3. **ICDF Evaporation Pond WAC.** This WAC (DOE-ID 2002c) specifies the requirements for waste to be disposed in the ICDF evaporation pond.

Integration between the various WACs will be achieved, by use of the ICDF Complex WAC as the master document, and through the use of the same waste profile by all facilities. The waste profile will help provide consistent documentation of the waste during shipment or transfer.

The following documents were developed in support of the ICDF Complex, including the ICDF evaporation pond design and ICDF Evaporation Pond WAC:

- **Leachate Generation Study (EDF-ER-269).** The Leachate Generation Study was used to determine how much leachate would be generated during normal landfill operations, and the volume of leachate that would be generated by the 25-year, 24-hour storm event. This includes a water balance to determine the amount of leachate expected to be generated based on precipitation, moisture content of incoming waste, water added for dust control and compaction, and evaporation.

- **Leachate/Contaminant Reduction Time (EDF-ER-274).** The Leachate/Contaminant Reduction Time Study calculated the amount of radionuclides expected in the leachate based on the waste inventory and the geochemistry of the waste and water.

- **Liner/Leachate Compatibility Study (EDF-ER-278).** The Liner/Leachate Compatibility Study was performed to determine the compatibility study of materials proposed for the ICDF liner system based on expected waste leachate and other aqueous wastes. The study concluded that the manufacturer-recommended limits associated with the high-density polyethylene (HDPE) geomembrane liners were several orders of magnitude higher than the estimated maximum concentrations. A GSE 60-mils HDPE geomembrane liner has been specified for the ICDF evaporation pond. Based on results of the study, hazardous constituent concentration limits necessary to ensure liner integrity were established. The study did not show any threat to the liner from radionuclides present in the waste to be managed at the ICDF evaporation pond.

- **Evaporation Pond Sizing with Water Balance and Make-up Water Calculations (EDF-ER-271).** These calculations determined the size and depth of the evaporation pond based on leachate generation, precipitation, effluent from the SSSTF treatment processes, purge/development water from CERCLA groundwater monitoring wells, and evaporative potential.

1.5 Responsibilities

Responsibilities for use of the ICDF Complex are described in the ICDF Complex WAC, Section 1.5. Responsibilities specific only to the evaporation pond are described in the following sections.

1.5.1 Evaporation Pond Management

The ICDF evaporation pond management will include the selected organizations assigned to operate the ICDF Complex. These personnel will be responsible for:

- Maintaining the WAC document for the ICDF evaporation pond

- Review and approval/rejection of requests for disposal of aqueous wastes based on health and safety, the waste acceptance documents, and environmental regulations

- Maintaining a proactive quality assurance (QA) program for timely identification of deficiencies and implementation of appropriate corrective actions, including verification procedures to ensure that incoming wastes meet the ICDF Evaporation Pond WAC

- Conducting periodic inspections of the pond

- Leak detection monitoring

- Oversight of off-loading events.

1.5.2 Evaporation Pond Users

The users of the ICDF evaporation pond will be required to:

- Participate in planning discussions and submit long-term operational project schedules that involve ICDF evaporation pond usage.

- Develop, document, and implement appropriate waste sampling and analysis plans when required for development of waste profiles.

- Prepare aqueous waste profiles, hazardous waste determination, and obtain ICDF Complex Operations Manager acceptance for each aqueous waste source or group of aqueous waste sources, that will be disposed in the ICDF evaporation pond.

- For waste not in the design basis, compare the new waste with the WAC for the ICDF evaporation pond, and determine if the new waste is within the acceptable limits.

- Obtain and/or confirm ICDF Complex Operations Manager's authorization for disposal of the aqueous waste in the ICDF evaporation pond.

- Transport approved aqueous wastes to the ICDF Complex.

2. WASTE PROFILE PROCESS

The waste profile process is described in Section 2 of *ICDF Complex Waste Acceptance Criteria*, (DOE-ID 2002a) (see Table 1-1).

2.1 General Requirements

General requirements of the waste profile process are described in Section 2.1 of the ICDF Complex WAC (DOE-ID 2002a) (see Table 1-1).

2.2 General Class of Waste

General classes of waste are described in Section 2.2 of the ICDF Complex WAC (DOE-ID 2002a) (see Table 1-1). Wastes specific to the evaporation pond are described below. Each of the wastes listed in Table 2-1 is further described in a subsequent section, and guidelines for the waste profile appear in Section 3 of the ICDF Complex WAC.

Table 2-1. Summary of acceptable types of wastes for the ICDF Evaporation Pond WAC.

Waste Type Accepted at the ICDF	Content Accepted
ICDF leachate	All ICDF leachate is acceptable. LDRs do not apply, because the ICDF evaporation pond is a CAMU for the ICDF leachate.
ICDF Complex operations waste	Aqueous waste from ICDF Complex operations must meet the applicable hazardous and radioactive ICDF Evaporation Pond WAC.
WAG 3 and ICDF Complex groundwater and monitoring waste	Groundwater monitoring waste from all the WAGS (e.g., purge, development, sampling, and decontamination water) will be accepted at the ICDF evaporation pond if it meets the hazardous and radiological evaporation pond WAC. Groundwater monitoring waste generated outside the WAG 3 AOC must meet the substantive portions of the applicable LDRs.
Secondary aqueous wastes	Secondary aqueous wastes generated by decontamination activities and other secondary activities will be disposed in the ICDF evaporation pond.
Other Aqueous Waste	Aqueous wastes (e.g., groundwater well development, purging, sampling and decontamination activities) generated from "INEEL CERCLA remedial and removal actions that are primarily mixed LLW would be acceptable (see footnote a) for disposal in the ICDF evaporation pond." Activities that meet the definition of support are those which are identified or otherwise listed in a primary or secondary document or in another CERCLA authorized action, as defined in the Federal Facility Agreement and Consent Order including activities that support both CERCLA and non-CERCLA objectives.

2.3 Composition and Waste Containers

Composition and waste containers are described in Section 2.3 of the ICDF Complex WAC (DOE-ID 2002a) (see Table 1-1). Details specific to the evaporation pond are in the following sections.

Waste containers may be used to transport liquid wastes to the ICDF evaporation pond. Waste containers must be capable of being discharged to the pond via pumping at the pump station. Tanker trucks and large volume tanks on flatbeds will be acceptable containers.

2.4 Physical and Chemical Characterization

Physical and chemical characterization requirements are described in Section 2.4 of the ICDF Complex WAC (DOE-ID 2002a) (see Table 1-1). Characterization that is specific only to the evaporation pond is found in the following sections.

2.4.1 Type of Acceptable Knowledge

Types of Acceptable Knowledge are described in Section 2.4.1 of the ICDF Complex WAC (DOE-ID 2002a). Types of Acceptable Knowledge requirements specific to the ICDF Evaporation Pond WAC are: analytical results from previous sampling of the same well. If the information is sufficient to quantify constituents and characteristics, as required by the regulations and unit-specific acceptance criteria, the information is considered acceptable knowledge.

2.4.2 Land Disposal Restriction Knowledge

LDRs do not apply to waste generated within the WAG *3* AOC. For waste generated outside the WAG *3* AOC, types of acceptable LDR knowledge are described in Section 2.4.1 of the ICDF Complex WAC.

3. WASTE ACCEPTANCE PROCESS

The waste acceptance process is described in Section 3 of the ICDF Complex WAC, Table 1-1. Parts of the process that are specific to the evaporation pond are described in the following sections.

3.1 Planning

The waste planning process is described in Section 3 of the ICDF Complex WAC (DOE-ID 2002a). Parts of the process that are specific to the evaporation pond are described in the following sections.

3.2 Waste Acceptance Scheduling Requirements

Waste acceptance scheduling requirements are described in Section 3.2 of the ICDF Complex WAC (DOE-ID 2002a), Table 1-1.

3.3 Waste Tracking System

The waste tracking system is described in Section 3.3 of the ICDF Complex WAC (DOE-ID 2002a), Table 1-1.

3.4 Data Quality Objectives

Data quality objectives are described in Section 3.4 of the ICDF Complex WAC (DOE-ID 2002a), Table 1-1.

3.5 Waste Profile

The waste profile is described in Section 3.5 of the ICDF Complex WAC (DOE-ID 2002a), Table 1-1. Waste profile processes specific to the evaporation pond are described in the following sections.

3.5.1 ICDF Leachate

The ICDF leachate will be discharged directly to the ICDF evaporation pond. The ICDF Complex Operations Manager will be responsible for preparing annual waste profile sheets for the leachate. The leachate management system will record volumes and flow rate of leachate pumped to the ICDF evaporation pond.

3.5.2 Other Aqueous Wastes

The ICDF Complex Operations Manager will be responsible for preparing the waste profiles and designating the wastes that are generated inside the ICDF Complex. Individual discharges of aqueous waste to the ICDF evaporation pond must be accompanied by a waste profile sheet, but separate analytical data are not required for each discharge of water from the same source (e.g., decontamination water). However, the volumes from non-leachate sources will be tracked and recorded.

3.6 Waste Certification Process

The waste certification process is described in Section 3.6 of the ICDF Complex WAC (DOE-ID 2002a), Table 1-1.

3.7 Verification as Packaged

Verification of the waste as packaged is described in Section 3.7 of the ICDF Complex WAC (DOE-ID 2002a), Table 1-1.

3.8 Receipt Verification

Waste receipt verification is described in the ICDF Complex WAC (DOE-ID 2002a), Table 1-1

3.9 Non-Conforming Waste

Waste received with non-compliant conditions is described in Section 3.9 of the ICDF Complex WAC (DOE-ID 2002a), Table 1-1.

3.10 Records

Records requirements are described in Section 3.10 of the ICDF Complex WAC (DOE-ID 2002a), Table 1.1.

3.11 Packaging and Shipping

Waste packaging and shipping requirements are described in Section 3.11 of the ICDF Complex WAC (DOE-ID 2002a) (Table 1-1). Evaporation pond specific requirements are discussed below.

3.11.1 Packaging and Shipping

Packaging and shipping are described in Section 3.11 of the ICDF Complex WAC (DOE-ID 2002a).

3.12 Waste Delivery

3.12.1 ICDF Leachate

The ICDF leachate will be pumped to the ICDF evaporation pond from the leachate collection sump.

3.12.2 Other Wastes

The monitoring well purge and development water will be delivered in tanker trucks, 55-gal drums, or pumped directly to the pond from trucks, tanks, trailer tanks, or drums. Decontamination water will be pumped from the decontamination building to the evaporation ponds. All other discharges will be by truck or tanker discharged at the ICDF unloading station. The possibility exists for both the decontamination water and leachate to be transported by trucks should an equipment failure or pipeline leak disable the pumping systems.

4. WASTE ACCEPTANCE BASIS

4.1 Criteria Basis

The basis for acceptance criteria includes protection of human health (including worker health and safety), protection of the liner system, compliance with ARARs per the OU 3-13 ROD to protect human health and the environment, compliance with applicable DOE orders, and best management practices. This section develops the basis for the ICDF Complex WAC numerical criteria. The actual numerical criteria are presented in Section 5.

4.1.1 Protection of Human Health and the Environment

Occupational exposure for radiological and chemical contaminants will be maintained as low as reasonably achievable (ALARA). During the operational phase, operating procedures developed for the ICDF evaporation pond will be followed. The operational procedures will protect the environment by complying with environmental regulations called out in the OU 3-13 ROD as applicable or relevant and appropriate requirements (ARARs).

Worker protection shall be provided by compliance with the requirements of the site-specific health and safety program for the ICDF Complex operations (INEEL 2002). Worker exposure is evaluated in "Landfill Risk Assessment for Workers" (EDF-ER-327). Protection of the public will be based on the National Emission Standard for Hazardous Air Pollutants (NESHAPs) modeling of radionuclide exposure to constituents in the evaporation pond (EDF-ER-290). Protection of ecological receptors will be based on a Screening Level Ecological Risk Assessment (SLERA) for constituent concentrations in both the landfill and the evaporation pond (EDF-ER-311).

4.1.2 Protection of the ICDF Evaporation Pond Liner System

The expected leachate concentrations are compatible with the earthen and synthetic materials proposed for the ICDF landfill and evaporation liner systems based on EPA Method 9090 compatibility tests performed at similar facilities and manufacturers' recommendations (EDF-ER-269). The manufacturers' compatibility data and published compatibility tests were reviewed to suggest ICDF maximum leachate limits for liner compatibility. These leachate limits were used to determine the maximum allowable waste soil concentrations of organic and inorganic constituents that, if placed in the ICDF landfill, would not cause significant degradation of the landfill or evaporation pond liner system. Based on results of the study, hazardous constituent concentration limits necessary to ensure liner integrity are listed in "Liner/Leachate Compatibility Study" (EDF-ER-269) are included as Appendix A of this document.

Many of the individual design inventory constituents have not been included in the composition of leachate used for published compatibility studies. However, the constituents used in the published studies are in similar chemical groups as the constituents in the ICDF design inventory and therefore, would react similarly with the liner materials. Moreover, the use of general chemical categories rather individual constituents provide a worst-case scenario due to possible synergistic effects of mixed compounds.

Table 4-1 provides the recommended maximum concentration of chemical categories that if in the landfill leachate, may be incompatible with the polymeric or earthen material comprising the ICDF liner system. These limits are based on review of the published liner compatibility studies and manufacturers' recommendations. Where available, the recommended maximum allowable concentration with regard to liner compatibility for individual constituents is provided in Appendix A and the total for the chemical category in Table 4-1 is not exceeded.

Table 4-1. Maximum allowable concentrations in waste water by chemical category for liner compatibility.

Chemical Category	Compatible Concentration for HDPE	Compatible Concentration for Geosynthetic Clay Liner And Clay	Recommended ICDF Maximum Concentration
Organics	500,000“mg/L	500,000[c] mg/L	500,000 mg/L
Acids and bases	750,000”mg/L	500,000[c] mg/L	500,000 mg/L
Inorganic	500,000“mg/L	500,000[c] mg/L	500,000 mg/L
Dissolved salts	No limit	35,000 mg/L	35,000 mg/L
Strong oxidizers	1,000 mg/L	No limit[b]	1,000 mg/L
Radionuclides	1,000,000“rads	No limit[b]	1,000,000 rads
pH	0.5-13.0“	0.5-13.0	0.5-13.0

a. Based on the manufacturers' maximum concentration of the list of constituents tested by the manufacturers. The manufacturers' recommendations are provided in Appendix A.

b. “No limit” indicates a capacity for pure product that will not adversely affect the liner

c. Based on reported literature values.

The concentration and exposure limits in Table 4-1 provide WAC for chemical categories with regard to liner compatibility. These values can be used as a general guide to determine WAC if individual constituents in the leachate are lower than the limits provided in Appendix A.

The manufacturer for the ICDF geomembrane recommends that leachate have a pH between 0.5 and 13 pH units. Recommended manufacturers' limits for strong oxidizers are 1,000 to 500,000 mg/L and metals, salts and nutrients of 500,000 mg/L. These limits are far above the concentrations expected in the leachate from the ICDF landfill and will be used to determine the maximum allowable concentrations in the waste soil that if placed in the ICDF landfill would not cause significant degradation of the liner system.

4.1.3 Compliance with ARARs

The ICDF Complex is a part of a CERCLA Remedial Action (RA), and the ARARs are clearly identified in the OU 3-13 ROD. Compliance with these ARARs is documented in the ARARs Compliance Table for the ICDF Complex, which is found in the *Remedial Design/Construction Work Plan for the Waste Area Group 3 Staging, Storage, Sizing, and Treatment Facility* (DOE-ID 2002). Specific prohibited wastes are discussed in Section 5.1 of this document. ARARs that affect the WAC are those that limit what types of waste and concentrations/activities are allowed to enter the landfill. The specific ARARs that require numerical concentration/activity criteria in the WAC for various constituents are indicated in Table 5-2.

The pond was designed and will be operated in compliance with the ARARs. The majority of ARARs fall into broad categories that relate to design and operation, release detection, and monitoring. For example, the regulations in 40 CFR, 264.221, Subpart K, *Surface Impoundment Design and Operating Requirements* were used as a basis for design requirements for the ICDF evaporation pond. ARARs that affect the WAC are those that limit what types of waste and what concentrations/activities of

contaminants are allowed to enter the pond. These ARARs are discussed below, and the numerical limitations are included in the development of the WAC in Section 5.

4.1.3.1 The Corrective Action Management Unit. The OU 3-13 ROD (page 11-15) states:

> *"Based on currently available cost information, all Group 3 soils will be disposed in the ICDF It is anticipated that thisfacility will consist of a storage/staging building, an evaporation pond or equivalent surface impoundment, a waste shredder, solidification/stabilization treatment tanks, and associated systems. The evaporation pond will be designated as a Corrective Action Management Unit (CAMU). The evaporation pond will be designed and constructed to treat ICDF leachate and other aqueous wastes generated during operations."*

The CAMU rule (40 CFR 264.552) has the most effect on the WAC. The ICDF evaporation pond is designated as a CAMU unit in the OU 3-13 ROD. CAMU "means an area within a facility that is used only for managing remediation wastes for implementing corrective action or cleanup at the facility." For purposes of this WAC, the INEEL is considered "the facility." Subpart **S** of 40 CFR 264 specifically provides for Corrective Action for Solid Waste Management Units or CAMU in 40 CFR 264.552(a):

> *To implement remedies under 264.101 or RCRA 3008 (h) or to implement remedies at a permitted facility that is not subject to 264.101, the Regional Administrator may designate an area at thefacility as a corrective action management unit, as defined in 260.10, under the requirements in this section. A CAMU must be located within the contiguous property under the control of the owner/operator where the wastes to be managed in the CAMU originated. One or more CAMUs may be designated at a facility.*
>
> *(1) Placement of remediation waste into or within a CAMU does not constitute land disposal of hazardous wastes.*
>
> *(2) Consolidation or placement of remediation wastes into or within a CAMU does not constitute creation of a unit subject to minimum technology requirements.*

The impact of the CAMU rule is that aqueous wastes generated within the INEEL that has an approved Waste Approval Form and that meet the evaporation pond WAC can be disposed to the pond without meeting LDRs or minimum technology requirements.

***4.1.3.2 IDAPA 58.01.05.008 (40 CFR 264, Subpart BB)* Air Emissions Standards for Equipment Leaks.** These standards apply to equipment that contains or contacts hazardous wastes with organic concentrations of at least 10% by weight. The standards are for specific pieces of equipment (e.g., pumps, compressors, and pressure relief valves).

4.1.3.3 IDAPA 58.01.05.008 (40 CFR 264, Subpart CC) Air Emission Standards for Tanks, Surface Impoundments, and Containers. The standard 40 CFR 264.1082(c)(1) provides:

> "A tank, surface impoundment, or container for which all hazardous waste entering the unit has an average volatile organic (VO) concentration at the point of waste origination of less than 500 parts per million (ppm) by weight. The average VO concentration shall be determined using the procedures in

264.1083 (a) of this subpart. The owner or operator shall review and update, as necessary, this determination at least once every 12 months following the date of the initial determination for the hazardous waste streams entering the unit."

4.7.3.4 40 CFR 67.92 National Emission Standards for Hazardous Air Pollutants (NESHAPs) for radionuclides from DOE. This regulation states, "Emissions of radionuclides to the ambient air from Department of Energy facilities shall not exceed those amounts that would cause any member of the public to receive in any year an effective dose equivalent of 10 mRem/yr."

4.7.3.5 40 CFR 67.93 Facilities, Emission Monitoring and Emission Compliance. This regulation specifies how compliance with 40 CFR 61.92 is demonstrated.

4.1.3.6 Hazardous Waste. Wastes not subject to LDRs (that have not triggered placement) are acceptable for direct disposal in the ICDF evaporation pond provided that the waste meets the evaporation pond WAC.

Hazardous waste that has triggered placement, is prohibited from disposal at the ICDF evaporation pond unless it meets RCRA LDRs of 40 CFR 268. These LDR limits are given in Table 5-3. Hazardous waste is defined in 40 CFR 261 Subparts C and D of the RCRA. The ICDF evaporation pond cannot accept D-code characteristic waste, F-listed wastes, and most P-code and U-code wastes from outside the WAG 3 AOC, or wastes that have triggered placement that are above LDR requirements.

Wastes may trigger placement by being treated (e.g., neutralization, solidification using reagents) or being placed in a permitted RCRA facility prior to disposal to the ICDF landfill. Wastes that have been treated to meet the LDR for characteristic waste must also meet the UTS for underlying hazardous constituents. Determination of whether a waste is listed or characteristic must be performed by the generating site and documented on the waste profile.

4.7.3.7 Chelating compounds. Wastes containing greater than 1% chelating compounds cannot be placed in the ICDF landfill (DOE Order 435.1).

4.1.3.8 Inorganics/Other. There are no ARAR-based limitations on inorganic content in the wastes from inside the AOC (LDRs do not apply).

4.1.3.9 Radionuclides. Regulatory limits on radionuclide activity that can be disposed to the ICDF evaporation pond are invoked by the ROD (DOE-ID 1999) and DOE Order 435.1 as discussed below.

Record of Decision: The Appendix A to the OU 3-13 Record of Decision *Response to Public Comment* states in response to comments #28, 226, and 230 that waste containing greater than 10 nanocuries per gram (nCi/g) of TRU radionuclides is prohibited from disposal at the ICDF landfill (DOE-ID 1999).

DOE Order 435.1 defines TRU waste as follows: TRU waste is radioactive waste containing more than 100 nCi/g (3,700 becquerels) of alpha-emitting TRU isotopes per gram of waste, with half-lives greater than 20 years, except for:

1. High-level radioactive waste.

2. Waste that the Secretary of Energy has determined, with the concurrence of the Administrator of the Environmental Protection Agency, does not need the degree of isolation required by the 40 CFR Part 191 disposal regulations.

3. Waste that the NRC has approved for disposal on a case-by-case basis in accordance with 10 CFR Part 61.

The alpha-emitting TRU isotopes, with half-lives greater than 20 years that are listed in the Design Inventory are: Np-237, Pu-238, Pu-239, Pu-240, Pu-242, Pu-244, Am-241, Am-243, Cm-243, Cm-245, Cm-246, Cm-247, Cm-248, Cm-250, Bk-247, Cf-249, and Cf-251. These isotopes may be present in unequal amounts the sum of all TRU isotopes must total less than 10 nCi/g for the entire waste stream.

The NRC performance-based disposal requirement (10 CFR Part 61) is invoked by DOE Order 435.1 and includes radiological waste classification. Waste greater than Class C wastes cannot be disposed to the ICDF landfill. Class C is a solid waste classification and is not applicable to the evaporation pond WAC.

4.2 Development of Chemical and Radiological WAC for the Evaporation Pond

This ICDF Evaporation Pond WAC development logic is shown in the flow diagram (Figure 4-1). The two criteria (liner compatibility criteria and ARAR criteria) were evaluated to determine the evaporation pond WAC. The lowest concentration of the two criteria was selected as an evaporation WAC in Appendix B.

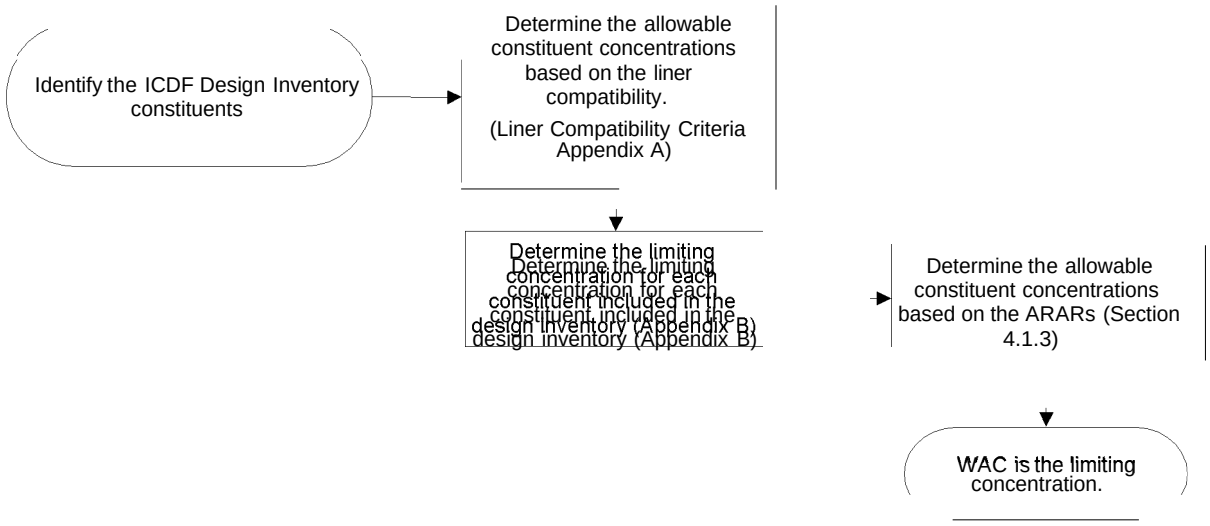

Figure 4-1. ICDF Evaporation Pond WAC development logic.

The various numerical criteria (liner compatibility criteria and ARAR criteria) are summarized in tables in Appendix B. For the liner compatibility criteria for radionuclides, the liner of the evaporation pond can accept a total dose of 1,000,000 rads over the 45-year period. Concentration activity of incoming waste will be used to calculate a dosage and compared to the dose generated by the waste already in the pond. This will be tracked and compared to allowable dosage not to exceed a total of 1,000,000 rads. The issue is 1 M Rad is a cumulative dose over the 45 years.

Individual constituents in the ICDF design inventory were evaluated to determine maximum allowable evaporation pond waste concentrations that if placed in the evaporation pond would be compatible with the liner system. Many of the individual design inventory constituents have not been included in the composition of waste used for published compatibility studies. However, the constituents

used in the published studies are in similar chemical groups as the constituents in the ICDF design inventory and therefore, would react similarly with the liner materials. Moreover, the use of general chemical categories rather than individual constituents provide a worst-case scenario due to possible synergistic effects of mixed compounds. For these constituents, the maximum allowable concentration is based on the total concentration for a specific chemical category (e.g., organics or inorganics). The maximum allowable concentrations for chemical categories are provided in Table 4-1. The numerical WAC for liner compatibility for these constituents is shown in Appendix B at the maximum allowable for the chemical group, with a footnote that the sum of the entire chemical group cannot exceed this concentration.

4.3 Tracking Waste Acceptance Criteria During Operations

The WAC presented herein have been developed based on data regarding the proposed design inventory (governing leachate quality and quantity), liner compatibility, and regulatory requirements. The liner compatibility criteria are based on individual constituent limits and/or on a total maximum concentration by chemical category (i.e., 500,000 mg/L for total organics, or 1,000,000 rads total lifetime dose). Actual wastes entering the evaporation ponds will have different contaminant concentrations from the assumptions made in the WAC and periodic evaluation will be necessary to track the actual contaminants entering the landfill for comparison against RAO, liner compatibility, or other regulatory limits.

The following methodology is provided as one method of tracking receipt of actual waste contaminants and contaminant masses versus the proposed Evaporation Pond WAC:

1. For leachate entering the pond from the landfill, from the SSSTF wastewater discharge, or from other sources, routine pond sampling will be performed to quantify waste constituents and concentrations. Routine sampling frequencies and parameters will be developed for the facility as part of the ICDF Complex RAWP. Waste container profile forms will be reviewed for each liquid waste shipment received at the ponds.

2. The concentrations of each constituent placed in the evaporation ponds will be calculated for the evaporation pond using the information from the routine sampling events.

3. A database or spreadsheet will be kept identifying each constituent, average and maximum concentrations observed, and the cumulative mass of each constituent placed in the pond (where necessary).

4. At the same frequency as routine sampling, the average and maximum concentrations and total mass (where appropriate) of each constituent received at the facility will be compared to the Evaporation Pond WAC.

5. As waste is discharged to the evaporation pond, the tracking system will register each constituent mass. As the masses of certain constituents increase through addition of wastes, or concentrations of wastes increase through evaporation, the total amounts will be checked against individual limits and totals by chemical category to ensure WAC compliance. Adjustments or limitations in other constituents within a chemical category may be necessary to maintain WAC limits if total amounts approach WAC limits.

5. ACCEPTANCE CRITERIA FOR THE ICDF EVAPORATION POND

5.1 Prohibited Waste

The materials prohibited from disposal at the ICDF evaporation pond are described in this section

5.1.1 Non-WAG 3/ICDF Complex Groundwater Monitoring

Aqueous wastes generated from groundwater monitoring activities other than WAG 3 or ICDF Complex groundwater monitoring activities is prohibited from disposal in the ICDF evaporation pond.

5.1.2 Non-ICDF Complex Aqueous Waste Streams

Other aqueous waste streams not associated with operation of the ICDF Complex (e.g., ICDF landfill leachate, storm water, decontamination, secondary waste from treatment, etc.) are prohibited from disposal in the ICDF evaporation pond.

5.1.3 TRU Constituent Waste >10 nCi/g

Waste containing greater than 10 nCi/g as expressed in liquid units (10 nCi/mL or 1E + 07pCi/L) of TRU radionuclides is prohibited from disposal at the ICDF evaporation ponds.

5.1.4 TSCA Waste

TSCA waste is prohibited from disposal at the ICDF evaporation pond as described by the following:

- Asbestos waste is not aqueous waste.

- Direct disposal of PCB wastes is prohibited. Although unlikely, PCBs may be a component of the ICDF leachate. As a CAMU for the ICDF leachate, the evaporation pond may accept F039 (landfill leachate) waste.

5.1.5 Waste Capable of Detonation, Explosive Decomposition, or Reaction

Waste capable of detonation, explosive decomposition, or reaction at normal pressures and temperature, or explosive reaction with water (DOE Manual 435.1, IV G (d) (3)). This includes unreacted alkali metal (e.g., sodium). Chemicals that react with atmospheric oxygen to form shock-sensitive organic peroxides are prohibited at concentrations that are capable of generating an explosive reaction. Generally, process knowledge will be used to make the determination that a waste is or is not capable of detonation, explosive decomposition, or reaction.

5.1.6 Waste Capable of Generating Toxic Gases, Vapors, or Fumes

Waste capable of generating toxic gases, vapors, or fumes harmful to persons transporting, handling, and disposing the waste (DOE Manual 435.1 IV G (d) (4)). Generally, process knowledge will be used to make the determination that a waste is or is not capable of generating toxic gasses, vapors, or fumes.

5.1.7 Hazardous Waste with Greater than 500 ppm Volatile Organic Compounds

Hazardous waste with greater than 500 ppm volatile organic compounds is prohibited. This gives the evaporation pond an exemption from IDAPA 58.01.05.05.008(40 CFR 264 Subpart CC).

5.1.8 Waste Exceeding the Class C Limit, as Defined in 10 CFR 61.55

Waste exceeding the Class C limit, as defined in 10 CFR 61.55 are prohibited per 10 CFR 61.55 Wastes exceeding the Class C limit cannot be disposed in the ICDF landfill. Class C is a solid waste classification and is not applicable to the Evaporation Pond WAC.

5.1.9 Waste Containing Greater than 1% Chelating Compounds by Weight

Waste containing greater than 1% chelating compounds by weight is prohibited. Chelating compounds can mobilize contaminants, and could potentially cause an exceedence of groundwater remedial action objectives (RAOs).

5.1.10 Spent Nuclear Fuel and High-Level Waste

Spent nuclear fuel and high-level waste are prohibited by the DOE Manual 435.1-1, Chapter II A.

5.1.11 Volatile Organic Wastes >500 ppm

Volatile organic wastes >500 ppm per total organic content are prohibited (40 CFR 264.1082 [c][I]).

5.1.12 Organic Wastes >10 %

Organic wastes >10 % by weight total organic content are prohibited (40 CFR 264.1050(b))

5.2 Waste Requiring Treatment

Wastes requiring treatment are listed in Table 5-1

Table 5-1. Materials restricted from disposal at the ICDF evaporation pond until the listed conditions have been met.

Restricted Material	Condition to be Met
Pyrophoric waste	Must be treated, to be nonflammable prior to being disposed
Liquid acid waste that exhibits the characteristic of low pH under the corrosivity tests of 40 CFR 261.22	Must be neutralized to pH >2 or <13[a]
Infectious waste, as defined in 10 CFR 61 (including "any substance that may harbor or transmit pathogenic organisms," which may apply to septic tank sludge)	Special handling procedures will be required.
Presence of oil sheen	PCB testing to verify no PCBs are present

a. Waste placement of pH extremes will be managed within facility to ensure low pH and high pH wastes are not mixed. Special handling procedures may be required for pH extremes.

5.3 Physical and Chemical Criteria

5.3.1 Liquid Waste

The ICDF evaporation pond is designed to accept only liquid (aqueous) wastes. Solids will be managed using filtration prior to acceptance. These waste streams include, but are not limited to, purge water and storm water. This does not apply to the liquid effluent directly disposed to the evaporation pond from the landfill.

Multilayered liquids or multiphased waste streams will be handled as follows:

- LNAPL: A LNAPL will be skimmed from the tank or container and handled separately
- DNAPL: A DNAPL will be handled by decanting the liquid on top and the remaining DNAPL separately
- Solids: Liquid will be decanted and solids handled at the SSSTF decontamination facility.

5.3.2 Land Disposal Restrictions

Land disposal restrictions apply to all wastes except the ICDF leachate or other wastes from within the WAG *3* AOC that have not triggered placement.

5.3.3 Heat Generation

Aqueous waste must be in a liquid form. Hot (>140°F) aqueous waste above this temperature will not be accepted until it has cooled to below 140°F.

5.3.4 Gas Generation

Liquid wastes which, upon discharge into the ICDF evaporation pond, could result in the generation of toxic gases will not be accepted into the ICDF evaporation pond.

5.4 Chemical Waste Acceptance Criteria

Logic for development of the maximum allowable risk-based chemical and radiological concentrations in the WAC is shown in Figure 4-1. The chemical limits for waste from within the WAG *3* AOC that have not triggered placement, and radiological WAC limits are shown in Table 5-2.

Table 5-*2*. Chemical and radiological Waste Acceptance Criteria for evaporation pond.

Maximum Allowable Evaporation Pond Liquid Concentration		
Constituent	ICDF Evaporation Pond WAC	Source of ICDF Evaporation Pond WAC
Radiological pCi/L		
Ac225	2.4E + 06	Pond Liner
Ac227	1.8E + 08	Pond Liner
Ac228	1.0E + 07	Pond Liner
Ag106	2.3E + 07	Pond Liner

Table 5-2. (continued).

Maximum Allowable Evaporation Pond Liquid Concentration

Constituent	ICDF Evaporation Pond WAC	Source of ICDF Evaporation Pond WAC
Ag108	No Limit	No Limit
Ag108m	8.7E + 06	Pond Liner
Ag109m	1.6E + 08	Pond Liner
AgllO	1.2E + 07	Pond Liner
Ag110m	5.1E + 06	Pond Liner
Aglll	No Limit	No Limit
Am241	2.6E + 06	Pond Liner
Am242	7.4E + 07	Pond Liner
Am242m	2.2E + 08	Pond Liner
Am243	2.7E + 06	Pond Liner
Am245	No Limit	No Limit
Am246	1.1E + 07	Pond Liner
At217	2.0E + 06	Pond Liner
Ba136m	No Limit	No Limit
Ba137m	2.1E + 07	Pond Liner
Ba140	No Limit	No Limit
Be 10	7.0E + 07	Pond Liner
Bi210	3.7E + 07	Pond Liner
Bi211	2.2E + 06	Pond Liner
Bi212	5.0E + 06	Pond Liner
Bi213	No Limit	No Limit
Bi214	6.6E + 06	Pond Liner
Bk249	4.3E + 08	Pond Liner
Bk250	1.2E + 07	Pond Liner
C 14	2.9E + 08	Pond Liner
Cd109	7.2E + 08	Pond Liner
Cd113m	7.7E + 07	Pond Liner
Cd115m	2.3E + 07	Pond Liner
Ce141	5.8E + 07	Pond Liner
Ce142	No Limit	No Limit
Ce144	1.3E + 08	Pond Liner
Cf249	2.3E + 06	Pond Liner
Cf250	2.4E + 06	Pond Liner
Cf251	2.4E + 06	Pond Liner
Cf252	1.4E + 09	Pond Liner
Cm241	8.3E + 07	Pond Liner

Table 5-2. (continued).

Maximum Allowable Evaporation Pond Liquid Concentration

Constituent	ICDF Evaporation Pond WAC	Source of ICDF Evaporation Pond WAC
Cm242	2.0E - 02	Other Reg.
Cm243	2.3E + 06	Pond Liner
Cm244	2.4E + 06	Pond Liner
Cm245	2.6E + 06	Pond Liner
Cm246	2.6E + 06	Pond Liner
Cm247	2.7E + 06	Pond Liner
Cm248	3.1E + 06	Pond Liner
Cm250	1.0E + 07	Other Reg.
Co-57	9.9E + 07	Pond Liner
CO-58	1.5E + 07	Pond Liner
Co-60	5.5E + 06	Pond Liner
Cr-51	3.9E + 08	Pond Liner
Cs132	No Limit	No Limit
Cs134	8.3E + 06	Pond Liner
Cs135	2.5E + 08	Pond Liner
Cs136	No Limit	No Limit
Cs137	8.3E + 07	Pond Liner
Er169	No Limit	No Limit
Eu150	4.9E + 07	Pond Liner
Eu152	1.1E + 07	Pond Liner
Eu154	9.3E + 06	Pond Liner
Eu155	1.2E + 08	Pond Liner
Eu156	No Limit	No Limit
Fe-59	1.1E + 07	Pond Liner
Fr221	2.2E + 06	Pond Liner
Fr223	3.3E + 07	Pond Liner
Gd152	6.6E + 06	Pond Liner
Gd153	9.3E + 07	Pond Liner
H 3	2.5E + 09	Pond Liner
Hf-181	1.9E + 07	Pond Liner
Ho166m	8.2E + 06	Pond Liner
I129	1.8E + 08	Pond Liner
I131	No Limit	No Limit
In114	1.8E + 07	Pond Liner
In114m	5.9E + 07	Pond Liner
In115	9.3E + 07	Pond Liner

Table 5-2. (continued).

Maximum Allowable Evaporation Pond Liquid Concentration		
Constituent	ICDF Evaporation Pond WAC	Source of ICDF Evaporation Pond WAC
In115m	No Limit	No Limit
K-40	2.3E + 07	Pond Liner
Kr81	No Limit	No Limit
Kr85	No Limit	No Limit
La138	No Limit	No Limit
La140	5.0E + 06	Pond Liner
Mn-54	1.7E + 07	Pond Liner
Nb92	9.4E + 06	Pond Liner
Nb93m	4.7E + 08	Pond Liner
Nb94	8.3E + 06	Pond Liner
Nb95	1.8E + 07	Pond Liner
Nb95m	5.8E + 07	Pond Liner
Nd144	7.5E + 06	Pond Liner
Nd147	No Limit	No Limit
Np235	1.4E + 09	Pond Liner
Np236	4.2E + 07	Pond Liner
Np237	2.9E + 06	Pond Liner
Np238	1.8E + 07	Pond Liner
Np239	3.4E + 07	Pond Liner
Np240	8.9E + 06	Pond Liner
Np240m	1.5E + 07	Pond Liner
Pa231	2.6E + 06	Pond Liner
Pa233	3.5E + 07	Pond Liner
Pa234	5.8E + 06	Pond Liner
Pa234m	1.7E + 07	Pond Liner
Pb209	7.2E + 07	Pond Liner
Pb210	3.7E + 08	Pond Liner
Pb211	2.8E + 07	Pond Liner
Pb212	4.4E + 07	Pond Liner
Pb214	2.6E + 07	Pond Liner
Pd107	4.3E + 08	Pond Liner
Pm146	1.7E + 07	Pond Liner
Pm147	2.3E + 08	Pond Liner
Pm148	1.1E + 07	Pond Liner
Pm148m	6.6E + 06	Pond Liner
Po210	2.7E + 06	Pond Liner

Table 5-2. (continued).

Maximum Allowable Evaporation Pond Liquid Concentration

Constituent	ICDF Evaporation Pond WAC	Source of ICDF Evaporation Pond WAC
Po211	1.9E + 06	Pond Liner
Po212	1.6E + 06	Pond Liner
Po213	1.7E + 06	Pond Liner
Po214	1.8E + 06	Pond Liner
Po215	1.9E + 06	Pond Liner
Po216	2.1E + 06	Pond Liner
Po218	2.4E + 06	Pond Liner
Pr143	No Limit	No Limit
Pr144	1.1E + 07	Pond Liner
Pr144m	1.2E + 09	Pond Liner
Pu236	2.5E + 06	Pond Liner
Pu237	2.3E + 08	Pond Liner
Pu238	2.6E + 06	Pond Liner
Pu239	2.8E + 06	Pond Liner
Pu240	2.8E + 06	Pond Liner
Pu241	2.7E + 09	Pond Liner
Pu242	2.9E + 06	Pond Liner
Pu243	7.3E + 07	Pond Liner
Pu244	3.1E + 06	Pond Liner
Pu246	9.2E + 07	Pond Liner
Ra222	2.2E + 06	Pond Liner
Ra223	2.4E + 06	Pond Liner
Ra224	2.5E + 06	Pond Liner
Ra225	1.2E + 08	Pond Liner
Ra226	3.0E + 06	Pond Liner
Ra228	1.2E + 09	Pond Liner
Rb86	No Limit	No Limit
Rb87	1.8E + 08	Pond Liner
Rh102	1.8E + 08	Pond Liner
Rh103m	3.7E + 08	Pond Liner
Rh106	8.8E + 06	Pond Liner
Rn218	2.0E + 06	Pond Liner
Rn219	2.1E + 06	Pond Liner
Rn220	2.3E + 06	Pond Liner
Rn222	2.6E + 06	Pond Liner
Ru103	2.6E + 07	Pond Liner

Table 5-2. (continued).

Maximum Allowable Evaporation Pond Liquid Concentration		
Constituent	ICDF Evaporation Pond WAC	Source of ICDF Evaporation Pond WAC
Ru106	3.6E + 08	Pond Liner
Sb124	6.3E + 06	Pond Liner
Sb125	2.7E + 07	Pond Liner
Sb126	4.7E + 06	Pond Liner
Sb126m	6.6E + 06	Pond Liner
Sc-46	6.7E + 06	Pond Liner
Se 79	2.7E + 08	Pond Liner
Sm146	5.6E + 06	Pond Liner
Sm147	6.3E + 06	Pond Liner
Sm148	7.1E + 06	Pond Liner
Sm149	No Limit	No Limit
Sm151	7.2E + 08	Pond Liner
Sn117m	No Limit	No Limit
Sn119m	7.2E + 08	Pond Liner
Sn121m	1.6E + 08	Pond Liner
Sn123	4.7E + 09	Pond Liner
Sn125	No Limit	No Limit
Sn126	2.7E + 07	Pond Liner
Sr89	4.0E + 07	Pond Liner
Sr90	2.4E + 07	Pond Liner
Tb160	2.6E + 07	Pond Liner
Tb161	No Limit	No Limit
Tc 98	1.1E + 07	Pond Liner
Tc 99	9.4E + 06	Pond Liner
Te123	1.7E + 08	Pond Liner
Te123m	8.3E + 08	Pond Liner
Te125m	5.8E + 07	Pond Liner
Te127	8.9E + 07	Pond Liner
Te127m	6.2E + 07	Pond Liner
Te129	1.6E + 08	Pond Liner
Te129m	2.4E + 07	Pond Liner
Th226	4.6E + 07	Pond Liner
Th227	2.2E + 06	Pond Liner
Th228	2.3E + 06	Pond Liner
Th229	2.6E + 06	Pond Liner
Th230	2.8E + 06	Pond Liner

Table 5-2. (continued).

Maximum Allowable Evaporation Pond Liquid Concentration		
Constituent	ICDF Evaporation Pond WAC	Source of ICDF Evaporation Pond WAC
Th231	3.0E + 06	Pond Liner
Th232	8.0E + 07	Pond Liner
Th234	3.5E + 06	Pond Liner
Tl207	2.1E + 08	Pond Liner
Tl208	2.9E + 07	Pond Liner
Tl209	3.6E + 06	Pond Liner
Tm170	3.6E + 06	Pond Liner
Tm171	4.2E + 07	Pond Liner
U230	No Limit	No Limit
U232	5.4E + 08	Pond Liner
U233	2.7E + 06	Pond Liner
U234	2.9E + 06	Pond Liner
U235	3.0E + 06	Pond Liner
U236	3.1E + 06	Pond Liner
U237	No Limit	No Limit
U238	3.2E + 06	Pond Liner
U240	3.4E + 06	Pond Liner
Xe127	8.9E + 07	Pond Liner
Xe129m	No Limit	No Limit
Xe131m	4.6E + 07	Pond Liner
Xe133	No Limit	No Limit
Y90	8.8E + 07	Pond Liner
Y91	1.5E + 07	Pond Liner
Zn65	2.3E + 07	Pond Liner
Zr93	2.4E + 07	Pond Liner
Zr95	7.3E + 08	Pond Liner
Organic (mg/L)		
1,1,1-Trichloroethane	2.0E + 01	Pond Liner
1,1,2,2-Tetrachloroethane	5.0E + 02	40 CFR Subpart CC
1,1,2-Trichloroethane	5.0E + 02	40 CFR Subpart CC
1,1-Dichloroethane	5.0E + 02	40 CFR Subpart CC
1,1-Dichloroethene	5.0E + 02	40 CFR Subpart CC
1,2,4-Trichlorobenzene	5.0E + 02	40 CFR Subpart CC
1,2-Dichlorobenzene	5.0E + 02	40 CFR Subpart CC
1,2-Dichloroethane	5.0E + 02	40 CFR Subpart CC
1,2-Dichloroethene (total)	5.0E + 02	40 CFR Subpart CC

Table 5-2. (continued).

Maximum Allowable Evaporation Pond Liquid Concentration		
Constituent	ICDF Evaporation Pond WAC	Source of ICDF Evaporation Pond WAC
1,3-Dichlorobenzene	5.0E + 02	40 CFR Subpart CC
1,4-Dichlorobenzene	5.0E + 02	40 CFR Subpart CC
1,4-Dioxane	5.0E + 02	40 CFR Subpart CC
2,4,5-Trichlorophenol	1.0E + 04	40 CFR Subpart BB
2,4,6-Trichlorophenol	1.0E + 04	40 CFR Subpart BB
2,4-Dichlorophenol	1.0E + 04	40 CFR Subpart BB
2,4-Dimethylphenol	1.0E + 04	40 CFR Subpart BB
2,4-Dinitrophenol	1.0E + 04	40 CFR Subpart BB
2,4-Dinitrotoluene	1.0E + 04	40 CFR Subpart BB
2,6-Dinitrotoluene	1.0E + 04	40 CFR Subpart BB
2-Butanone	5.0E + 02	40 CFR Subpart CC
2-Chloro-phthalene	2.0E + 03	Pond Liner
2-Chlorophenol	2.0E + 03	Pond Liner
2-Hexanone	5.0E + 02	40 CFR Subpart CC
2-Methyl-phthalene	1.0E + 04	40 CFR Subpart BB
2-Methylphenol	1.0E + 04	40 CFR Subpart BB
2-Nitroaniline	1.0E + 04	40 CFR Subpart BB
2-Nitrophenol	1.0E + 04	40 CFR Subpart BB
3,3'-Dichlorobenzidine	1.0E + 04	40 CFR Subpart BB
3-Methyl Buta-l	1.0E + 04	40 CFR Subpart BB
3-Nitroaniline	1.0E + 04	40 CFR Subpart BB
4,6-Dinitro-2-methylphenol	1.0E + 04	40 CFR Subpart BB
4-Bromophenyl-phenylether	2.0E + 03	40 CFR Subpart BB
4-Chloro-3-methylphenol	1.0E + 04	40 CFR Subpart BB
4-Chloroaniline	1.0E + 04	40 CFR Subpart BB
4-Chlorophenyl-phenylether	1.0E + 04	40 CFR Subpart BB
4-Methyl-2-Pentanone	5.0E + 02	40 CFR Subpart CC
4-Methylphenol	1.0E + 04	40 CFR Subpart BB
4-Nitroaniline	1.0E + 04	40 CFR Subpart BB
4-Nitrophenol	1.0E + 04	40 CFR Subpart BB
Ace-phthene	2.0E + 03	40 CFR Subpart BB
Ace-phthylene	2.0E + 03	40 CFR Subpart BB
Acetone	5.0E + 02	40 CFR Subpart CC
Acetonitrile	5.0E + 02	40 CFR Subpart CC
Acrolein	5.0E + 02	40 CFR Subpart CC
Acrylonitrile	5.0E + 02	40 CFR Subpart CC

Table 5-2. (continued).

Maximum Allowable Evaporation Pond Liquid Concentration		
Constituent	ICDF Evaporation Pond WAC	Source of ICDF Evaporation Pond WAC
Anthracene	2.0E + 03	40 CFR Subpart BB
Aramite	1.0E + 04	40 CFR Subpart BB
Aroclor-1016	0.0E + 00	Other Reg
Aroclor-1254	0.0E + 00	Other Reg
Aroclor-1260	0.0E + 00	Other Reg
Aroclor-1268	0.0E + 00	Other Reg
Benzene	5.0E + 02	40 CFR Subpart CC
Benzidine	1.0E + 04	40 CFR Subpart BB
Benzo(a)anthracene	2.0E + 03	Pond Liner
Benzo(a)pyrene	2.0E + 03	Pond Liner
Benzo(b)fluoranthene	2.0E + 03	Pond Liner
Benzo(g,h,i)perylene	1.0E + 04	40 CFR Subpart BB
Benzo(k)fluoranthene	1.0E + 04	40 CFR Subpart BB
Benzoic acid	1.0E + 04	40 CFR Subpart BB
bis(2-Chloroethoxy)methane	2.0E + 03	Pond Liner
bis(2-Chloroethyl)ether	2.0E + 03	Pond Liner
bis(2-Chloroisopropyl)ether	2.0E + 03	Pond Liner
bis(2-Ethylhexyl)phthalate	2.0E + 03	Pond Liner
Butane,1,1,3,4-Tetrachloro-	1.0E + 04	40 CFR Subpart BB
Butylbenzylphthalate	1.0E + 04	40 CFR Subpart BB
Carbazole	1.0E + 04	40 CFR Subpart BB
Carbon Disulfide	5.0E + 02	40 CFR Subpart CC
Chlorobenzene	5.0E + 02	40 CFR Subpart CC
Chloroethane	5.0E + 02	40 CFR Subpart CC
Chloromethane	5.0E + 02	40 CFR Subpart CC
Chrysene	2.0E + 03	Pond Liner
Decane, 3,4-Dimethyl	1.0E + 04	40 CFR Subpart BB
Diacetone alcohol	1.0E + 04	40 CFR Subpart BB
Dibenz(a,h)anthracene	2.0E + 03	Pond Liner
Dibenzofuran	1.0E + 04	40 CFR Subpart BB
Diethylphthalate	1.0E + 04	40 CFR Subpart BB
Dimethyl Disulfide	1.0E + 04	40 CFR Subpart BB
Dimethylphthalate	1.0E + 04	40 CFR Subpart BB
Di-n-butylphthalate	1.0E + 04	40 CFR Subpart BB
Di-n-octylphthalate	1.0E + 04	40 CFR Subpart BB
Eicosane	1.0E + 04	40 CFR Subpart BB

Table 5-2. (continued).

Maximum Allowable Evaporation Pond Liquid Concentration		
Constituent	ICDF Evaporation Pond WAC	Source of ICDF Evaporation Pond WAC
Ethyl cyanide	1.0E + 04	40 CFR Subpart BB
Ethylbenzene	5.0E + 02	40 CFR Subpart CC
Famphur	1.0E + 04	40 CFR Subpart BB
Fluoranthene	2.0E + 03	Pond Liner
Fluorene	2.0E + 03	Pond Liner
Heptadecane, 2,6,10,15-Tetra	1.0E + 04	40 CFR Subpart BB
Hexachlorobenzene	2.0E + 03	Pond Liner
Hexachlorobutadiene	5.0E + 02	40 CFR Subpart CC
Hexachlorocyclopentadiene	2.0E + 03	Pond Liner
Hexachloroethane	5.0E + 02	40 CFR Subpart CC
Indeno(1,2,3-cd)pyrene	2.0E + 03	Pond Liner
Isobutyl alcohol	5.0E + 02	40 CFR Subpart CC
Isophorone	2.0E + 03	Pond Liner
Isopropyl Alcohol/2-propanol	1.0E + 04	40 CFR Subpart BB
Kepone	1.0E + 04	40 CFR Subpart BB
Mesityl oxide	1.0E + 04	40 CFR Subpart BB
Methyl Acetate	1.0E + 04	40 CFR Subpart BB
Methylene Chloride	2.0E + 01	Pond Liner
-phthalene	2.0E + 03	Pond Liner
Nitrobenzene	5.0E + 02	40 CFR Subpart CC
N-Nitroso-di-n-propylamine	1.0E + 04	40 CFR Subpart BB
N-Nitrosodiphenylamine	1.0E + 04	40 CFR Subpart BB
Octane,2,3,7-Trimethyl	1.0E + 04	40 CFR Subpart BB
o-Toluenesulfo-mide	1.0E + 04	40 CFR Subpart BB
Pentachlorophenol	1.0E + 04	40 CFR Subpart BB
Phe-nthrene	2.0E + 03	Pond Liner
Phenol	1.0E + 04	40 CFR Subpart BB
Phenol,2,6-Bis(1,l-Dimethyl)	1.0E + 04	40 CFR Subpart BB
p-Toluenesulfo-mide	1.0E + 04	40 CFR Subpart CC
Pyrene	2.0E + 03	Pond Liner
RDX	5.0E + 03	Pond Liner
Styrene	2.0E + 03	Pond Liner
Tetrachloroethene	2.0E + 01	Pond Liner
Toluene	5.0E + 02	40 CFR Subpart CC
Tributylphosphate	1.1E + 03	Pond Liner
Trichloroethene	5.0E + 02	40 CFR Subpart CC

Table 5-2. (continued).

Maximum Allowable Evaporation Pond Liquid Concentration		
Constituent	ICDF Evaporation Pond WAC	Source of ICDF Evaporation Pond WAC
Trinitrotoluene	1.0E + 04	40 CFR Subpart BB
Undecane,4,6-Dimethyl-	5.0E + 03	Pond Liner
Xylene (ortho)	5.0E + 02	40 CFR Subpart CC
Xylene (total)	5.0E + 02	40 CFR Subpart CC
RDX	5.0E + 02	40 CFR Subpart CC
Trinitrotoluene	5.0E + 02	40 CFR Subpart CC
Inorganic (mg/L)		
Aluminum	5.0E + 05	Pond Liner
Antimony	5.0E + 05	Pond Liner
Arsenic	5.0E + 05	Pond Liner
Barium	5.0E + 05	Pond Liner
Beryllium	5.0E + 05	Pond Liner
Boron	5.0E + 05	Pond Liner
Cadmium	5.0E + 05	Pond Liner
Calcium	5.0E + 05	Pond Liner
Chloride	5.0E + 05	Pond Liner
Chromium	5.0E + 05	Pond Liner
Cobalt	5.0E + 05	Pond Liner
Copper	5.0E + 05	Pond Liner
Cyanide	5.0E + 05	Pond Liner
Dysprosium	5.0E + 05	Pond Liner
Fluoride	5.0E + 05	Pond Liner
Iron	5.0E + 05	Pond Liner
Lead	5.0E + 05	Pond Liner
Magnesium	5.0E + 05	Pond Liner
Manganese	5.0E + 05	Pond Liner
Mercury	5.0E + 05	Pond Liner
Molybdenum	5.0E + 05	Pond Liner
Nickel	5.0E + 05	Pond Liner
Nitrate	5.0E + 05	Pond Liner
Nitrate/Nitrite-N	5.0E + 05	Pond Liner
Nitrite	5.0E + 05	Pond Liner
Phosphorus	5.0E + 05	Pond Liner
Potassium	5.0E + 05	Pond Liner
Selenium	5.0E + 05	Pond Liner
Silver	5.0E + 05	Pond Liner

Table 5-2. (continued).

Maximum Allowable Evaporation Pond Liquid Concentration

Constituent	ICDF Evaporation Pond WAC	Source of ICDF Evaporation Pond WAC
Sodium	5.0E + 05	Pond Liner
Strontium	5.0E + 05	Pond Liner
Sulfate	5.0E + 05	Pond Liner
Sulfide	5.0E + 05	Pond Liner
Sulfur	5.0E + 05	Pond Liner
Terbium	5.0E + 05	Pond Liner
Thallium	5.0E + 05	Pond Liner
VaNo Limitdium	5.0E + 05	Pond Liner
Ytterbium	5.0E + 05	Pond Liner
Zinc	5.0E + 05	Pond Liner
Zirconium	5.0E + 05	Pond Liner

a. For radiological constituents that are not expected in the due to their low solubility or their factors as described in EDF-ER-274, Leachate/Contaminant Reduction Time Study, there is no pond liner compatibility limit.

A summary of maximum allowable concentrations or properties for miscellaneous parameters of the evaporation pond liquid as set by regulatory or liner compatibility requirements is shown in Table 5-3.

Table 5-3. Maximum allowable concentrations — miscellaneous parameters.

Constituent	Limitation	Source of limitation
Concentrations		
Organic	<10% by weight	40 CFR 264 BB
Volatile organics	<500 ppm	40 CFR 264 CC
PCB	No direct disposal (for wastes >50 ppm)	TSCA
Chelating compounds	<1%	DOE Order 435.1
pH	>0.5<13[a]	Manufacturer's limit
Temperature	<140°F	Manufacturer's limit
Transuranic alpha emitters	<10 nCi/g (<10 nCi/ml)	OU 3-13 ROD (DOE-ID 1999)

a. Waste placement of pH extremes Will be managed withm the facility.

5.4.1 LDR Wastes

For wastes from outside the WAG 3 AOC, or waste that has triggered placement, ICDF evaporation pond ICDF users shall determine whether waste is subject to RCRA LDRs by completing a hazardous waste determination (HWD). If the waste is determined to be hazardous, the ICDF user will be responsible for evaluating concentrations for the constituents of concern against the applicable treatment standards or prohibition levels. The federal treatment standards and prohibition levels that apply to LDR waste are published in 40 CFR 268.40 and a limited list of treatment standards is provided in Table 5-3.

For waste codes or constituents that are not found in Table 5-3, refer to 40 CFR 268.40, and 268.48 for applicable LDRs. The 1999 edition of the CFR shall be used for consistency with the ARARs cited in the OU 3-13 ROD. For waste that is hazardous by characteristic, the underlying hazardous constituents specified in 40 CFR 268.48, underlying hazardous constituents (UHCs) that can reasonably be expected to be present at the point of generation of the hazardous waste shall also be evaluated.

5.5 Radiological Criteria

5.5.1 Radiological Concentration Limits

Restrictions on the activity of radionuclides that can be placed in the ICDF evaporation pond will be determined on the basis of NESHAPs modeling, and in evaluating the potential impact to the SRPA from the ICDF evaporation pond. Radiological restrictions will also be based on a reasonably maximally exposed (RME) individual of the public calculated at 15 mREM/yr for all pathways.

Limits established for radionuclides are identified in Table 5-2. Waste containing greater than 10 nCi/g of TRU isotopes based on waste stream sampling will not be accepted.

5.5.2 Criticality Safety Limits

Criticality safety limits are described in Section 5.4.3 of the ICDF Complex WAC (DOE-ID 2002a) (see Table 1-1).

5.5.3 Non-Contact-Handled Wastes

Non-contact-handled waste shall meet the applicable dose rate restrictions of the Department of Transportation or an approved packaging safety analysis. Non-contact-handled waste shall be configured for unloading such that personnel exposures are maintained ALARA.

5.6 Packaging Criteria

Packaging criteria are described in Section 5.5 of the ICDF Complex WAC (DOE-ID 2002a) (see Table 1-1). Packaging criteria specific to the evaporation pond are described below.

5.6.1 Outer Packages

Criteria for outer packages are described in Section 5.5.1 of the ICDF Complex WAC (DOE-ID 2002a) (see Table 1-1).

5.6.2 Condition of Containers

Condition of containers is described in Section 5.5.2 of the ICDF Complex WAC (DOE-ID 2002a) (see Table 1-1).

5.6.3 Package Labeling and Marking

Package labeling and marking criteria are described in Section 5.5.6 of the ICDF Complex WAC (DOE-ID 2002a).

5.6.4 Bulk Containerized Aqueous Waste

The majority of non-leachate waste is expected to be delivered to the ICDF evaporation pond by pumping from bulk liquid containers. This waste may arrive in water trucks, water trailers, tanks, or other containers. Waste streams that comply with the ICDF Evaporation Pond WAC can be accepted for disposal at the ICDF evaporation pond as bulk shipments.

6. REFERENCES

10 CFR 61, 1999, "Licensing requirements for land disposal of radioactive waste," *Code of Federal Regulations,* Office of the Federal Register, July 1, 1999.

40 CFR 191, 1999, "Environmental Radiation Protection Standards for Management and Disposal of Spent Nuclear Fuel, High-Level and Transuranic Radioactive Wastes," *Code of Federal Regulations,* Office of the Federal Register, July 1, 1999.

40 CFR 260.10, 1999, "Hazardous Waste Management System: General," Part 10, "Definitions," *Code of Federal Regulations,* Office of the Federal Register, July 1, 1999.

40 CFR 261.3, 1999, "Identification and Listing of Hazardous Waste," Section 3, "Definition of hazardous waste," *Code of Federal Regulations,* Office of the Federal Register, July 1, 1999

40 CFR 262, 1999, "Standards Applicable to Generators of Hazardous Wastes," *Code of Federal Regulations,* Office of the Federal Register, July 1, 1999.

40 CFR 264, 1999, "Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities," *Code of Federal Regulations,* Office of the Federal Register, July 1, 1999.

40 CFR 264, 2001, "Standards for owners and operators of hazardous waste treatment, storage, and disposal facilities," Subpart K, "Surface impoundments," *Code of Federal Regulations,* Office of the Federal Register, July 1, 2001.

40 CFR 264, 1999, "Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities," Subpart **S,** "Corrective action management units," *Code of Federal Regulations,* Office of the Federal Register, July 1, 1999.

40 CFR 264.1050, 1999, "Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities," Section 1050 (Subpart BB), "Air emission standards for equipment leaks," *Code of Federal Regulations,* Office of the Federal Register, July 1, 1999.

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Appendix A
Liner Compatibility Tables

Table A-I. **Suggested** maximum **leachate** concentrations for organic constituents for liner compatibility.

Constituent[a]	Predicted Concentration in Leachate[b] (mg/L)	Compatible Concentration **For** HDPE (mg/L)	Compatible Concentration **For** GCL (mg/L)	Compatible Concentration For Clay (mg/L)	Suggested Maximum Leachate Concentration' (mg/L)
1,1,1-Trichloroethane	0.0609	[d]	[d]	20[e]	**20**
1,1,2,2-Tetrachloroethane	0.0002				
I,1,2-Trichloroethane	0.0013				
1,1-Dichloroethane	0.0105				
1,1-Dichloroethene	0.0004				
I,2,4-Trichlorobenzene	0.0113				
1,2-Dichlorobenzene	0.0734				
I,2-Dichloroethane	*0.0001*				
I,2-Dichloroethene (total)	0.0003				
1,3-Dichlorobenzene	0.0071	*2,000'*			**2.000**
I,4-Dichlorobenzene	5.1303				
I,4-Dioxane	0.0000				
2,4,5-Trichlorophenol	0.0441				
2,4,6-Trichlorophenol	0.0427				
2,4-Dichlorophenol	0.0371				
2,4-Dimethylphenol	0.3041				
2,4-Dinitrophenol	0.1705				
2,4-Dinitrotoluene	0.0488				
2,6-Dinitrotoluene	**0.2903**				
2-Butanone	0.0063	200,000'			*200,000*
2-Chlnro-phthalene	0.0108	2,000[g]			*2,000*
2-Chlorophenol	0.1867	2,000[g]			*2,000*
2-Hexanone	0.0001				
2-Methyl-phthalene	1.7772				

Table **A-1.** (continued).

Constituent'	Predicted Concentration in Leachate[b] (mg/L)	Compatiblc Concentration For HDPE (mg/L)	Compatible Concentration For GCL (mg/L)	Compatible Concentration For Clay (mg/L)	Suggested **Maximum** Leachate Concentration[c] (mg/L)
2-Methylphenol	**0.2014**		-	-	
2-Nitroaniline	0.1728		-	-	
2-Nitrophenol	0.0098		-	-	
3,3'-Dichlorobenzidine	0.1896		-	-	
3-Methyl Buta-l	0.0022		-	-	
3-Nitroaniline	0.0165		-	-	
4,6-Dinitro-2-methylphenol	0.0010		-	-	
4-Bmmophenyl-phcn ylether	0.0615	2,0009	-	-	**2,000**
4-Chloro-3-methyl phenol	0.08 10		-	-	
4-Chloroaniline	0.0052		-	-	
4-Chlorophenyl-phenylether	0.0288		-	-	
4-Methyl-2-pent anone	0.1131		-	-	
4-Meth ylphenoI	0.3766		-	-	
4-Nitroaniline	0.1728		-	-	
4-Nitrophenol	0.0029		-	-	
Ace-phthene	0.0399	2,000[g]	-	-	2,000
Ace-phthylene	0.3366	2,000[g]	-	-	*2,000*
Acetone	6.2674	200,000~	-	-	100,000'
Acetonitrile	0.0002		-	-	
Acrolein	0.0001	200,000'	-	-	200,000
Acrylonitrile	0.0000	200,000~	-	-	200,000
Anthracene	0.0083	2,000[g]	-	-	2,000
Aramite	0.0000		-	-	
Aroclor-1016	0.0000		-	-	

Table A-1. (continued).

Constituent"	Prcdictcd Concentration in Leachate[b] (mg/L)	Compatible Concentration For HDPE (mg/L)	Compatible Concentration For GCL (mg/L)	Compatible Concentration For Clay (mg/L)	Suggested Maximum Leachate Concentration' (mg/L)
Aroclor-1254	0.0002		-	-	
Aroclor-1260	0.0087		-	-	
Aroclor-1268	0.2891		-	-	
Benzene	1.3491	2,000[g]	-	-	1,000
Benzidine	0.0000	200.000~	-	-	200,000
Benzo(a)anthracene	0.0001	2,000[g]	-	-	2,000
Benzo(a)pyrene	0.0000	2,000[g]	-	-	2,000
Benzo(b)fluoranthene	0.0000	*2,0009*	-	-	2,000
Benzo(g,h,i)perylene	0.0000		-	-	
Benzo(k)fluoranthene	0.3024		-	-	
Benzoic acid	0.1162		-	-	
bis(2-Chloroethoxy)methane	0.0455	2,000[g]	-	-	*2,000*
bis(2-Chloroethyl)ether	*0.0535*	2,000[g]	-	-	2,000
bis(2-Chloroisopropyl)ether	0.0000	2,000[g]	-	-	2,000
bis(2-Ethylhexyl)phthalate	0.5714	2,000[g]	-	-	2,000
Butane,1,1,3,4-Tetrachloro-	0.0001		-	-	
Butylbenzylphthalate	*0.0080*	200,000~	-	-	200,000
Carbazole	0.1856		-	-	
Carbon Disulfide	0.0734		-	-	
Chlorobenzene	0.0679	2,000[g]	-	-	*2,000*
Chloroethane	*0.0000*		-	-	
Chloromethane	*0.0000*	2,000[g]	-	-	2,000
Chrysene	4.4199	2,000[g]	-	-	2,000
Decane, 3,4-Dimethyl	*0.0004*		-	-	

Table **A-1.** (continued).

Constituent'	Predicted Concentration in Leachate" (mg/L)	Compatible Conccntration For HDPE (mg/L)	Compatible Concentration For GCL (mg/L)	Compatible Concentration For Clay (mg/L)	Suggested Maximum Leachate Concentration' (mg/L)
Diacctone alcohol	0.0005		-	-	
Dibenz(a,h)anthracene	0.0006	2,000[g]	-	-	2,000
Dibenzofuran	0.4156		-	-	
Diethylphthalatc	0.1897	100,000[g]	-	-	100,000
Dimethyl Disulfide	0.0127		-	-	
Dimethylphthalatc	0.0001	100,000[g]	-	-	100,000
Di-n-butylphthalate	0.0000	100,000'	-	-	100,000
Di-n-octylphthalate	0.4370		-	-	
Eicosane	0.0472		-	-	
Ethyl cyanide	0.0000		-	-	
Ethylbenzene	0.0705	2,000[g]	-	-	2,000
Famphur	0.0000		-	-	
Fluoranthene	0.0221	2,000[g]	-	-	*2,000*
Fluorene	3.0594	2,000[g]	-	-	*2,000*
Heptadecane, 2,6,10,15-Tetrn	*0.0000*		-	-	
Hexachlorobenzene	0.0001	2,000[g]	-	-	*2,000*
Hcxachlorobutadiene	*0.0000*	2,000[g]	-	-	2,000
Hexachlorocyclopentadiene	*0.0025*	2,000[g]	-	-	*2,000*
Hexachloroethane	0.0000	2,000[g]	-	-	2,000
Indeno(1,2,3-cd)pyrene	**0.1585**	2,000[g]	-	-	*2,000*
Isobutyl alcohol	0.0001	500,000[g]	-	-	*500,000*
Isophorone	*0.*1829	2,000[g]	-	-	*2,000*
Isopropyl Alcohol/2-propanol	0.0000	500,000[g]	-	-	*500.000*

Table A-1. (continued)&

Constituent'	Predicted Concentration in Leachate[b] (mg/L)	Compatible Concentration For HDPE (mg/L)	Compatible Concentration For GCL (mg/L)	Compatible Concentration For Clay (mg/L)	Suggested Maximum Leachate Concentration[c] (mg/L)
Kepone	0.2511		-		
Mesityl **oxide**	1.2939		-		
Methyl Acetate	***0.0057***		-		
Methylene Chloride	0.0165	2,000[g]	-	20[e]	*20*
-phthalene	1.9193	2,000[g]	-		*2,000*
Nitrobenzene	0.0948	100,000[g]	-		100,000
N-Nitroso-di-n-propylamine	*0.0035*	100,000~	-		100,000
N-Nitrosodiphenylamine	0.1896	100,000[g]	-		100,000
Octane,2,3,7-Trimethyl	0.0027		-		
o-Toluenesulfo-mide	**0.0033**		-		
Pentachlorophenol	0.0046	100,000[g]	-		100,000
Phe-nthrene	8.8500	2,000[g]	-		*2,000*
Phenol	*0.1370*	100,000[g]	-		100,000
Phenol,2,6-Bis(1,1-Dimethyl)	0.0674		-		
p-Toluenesulfo-midc	*0.0000*		-		
Pyrene	**3.2501**	*2,0008*	-		*2,000*
RDX	*0.0000*	5,000[g]	-		*5,000*
Styrene	*0.0000*	2,000[g]	-		2,000
Tetrachloroethene	**0.0235**	5,000[g]	-	20[h]	20
Toluene	16.3666		-		
Tributylphosphate	1.2292	2,000[g]	-	1,100[e]	1,100
Trichloroethene	1.1526		-		
Trinitrotoluene	*0.0000*		-		
Undecane,4,6-Dimethyl-	*0.0003*	5,000[g]	-		5,000

Table **A-1.** (continued).

Constituent[a]	Predicted Concentration in Leachate[b] (mg/L)	Compatible Concentration For HDPE (mg/L)	Compatible Concentration For GCL (mg/L)	Compatible Concentration For Clay (mg/L)	Suggested Maximum Leachate Concentration[c] (mg/L)
Xylene (ortho)	0.0071				
Xylene (total)	6.2805				

Notes

a. Constituent reported in the "INEEL **CERCLA** Disposal Facility Design Inventory (EDF-ER-264).

b. Predicted leachate concentration in the first year of the ICDF landfill operation (EDF-ER-274).

c. The suggested maximum concentration selected for the ICDF liner system is based on the lowest of the concentrations listed **for** HDPE, **GCL,** and clay materials and **are** applicable **for** the leachate in the landfill and the waste liquids in the evaporation ponds.

d. "–" indicates that a specific test value **was** not available, compatibility issues are not anticipated.

e. **The** TCE solubility limit in water is 1,100mg/L. **A** minimum **of 2** pore volumes of permeant **liquid was** passed through the clay sample or until the concentration of total organic carbon in the influent and effluent were the same (Bowders and Daniel 1988). **No** significant change in permeability **was** observed.

f. From "Evaluation of Liner/Leachate Chemical Compatibility for the Environmental Restoration Disposal Facility." BHI-00359.

g. From manufacturer specifications.

h. **20** mg/l is the typical concentration of leachate found in muncipal landfills. **No** change in clay permeability **was** observed at this concentraiion (Kim, Tuncer, and Park **1999).**

i. Maximum allowable concentration reduced by 50% since liner may reflect some attack at a pure concentration based **on** manufacturers maximum concentration data (see Appendix B **of** EDF-ER-278).

Table A-2. Suggested maximum leachate concentrations for inorganic constituent for liner compatibility.

Constituent[a]	Predicted Concentration in Leachate[b] (mg/L)	Compatible Concentration For IIDPE (mg/L)	Compatible Concentration for GCI, (mg/L)	Compatible Concentration for Clay (mg/L)	Suggested Maximum Leachate Concentration[a] (mg/L)
Aluminum	28.3029				
Antimony	0.1165				
Arsenic	1.8470	500,000[d]	-	[e]	500,000
Barium	3.5848				
Beryllium	0.0011				
Boron	36.4728	500,000[d]		[e]	*500,000*
Cadmium	0.5917	500,000[d]		[e]	500,000
Calcium	4035.0217	*500,000"*		[e]	500.000
Chloride	31.1061				
Chromium	1.3691				
Cobalt	0.5999	500,000[d]		[e]	500,000
Copper	1.4906	500,000[d]		[e]	500,000
Cyanide	4.0932	500,000[d]		[e]	500.000
Dysprosium	0.2472				
Fluoride	64.434I				
Iron	46.5528				
Lead	0.5753				
Magnesium	883.9838	500,000"	-	[e]	500,000
Manganese	4.1300				
Mercury	49.6286				
Molybdenum	1.0117	500,000[d]		[e]	500,000
Nickel	0.1964				
Nitrate	65.4429				
Nitrate/Nitrite-N	3.6979				
Nitrite	0.1414				
Phosphorus	19.2492	500,000[d]	-	[e]	500,000
Potassium	74.8819	500,000[d]		[e]	500,000
Selenium	0.2084	500,000[d]	-	[e]	500.000
Silver	0.1092				
Sodium	2.77 I6				
Strontium	1.5094	*500,000"*		[e]	500,000
Sulfate	342.1180				
Sulfide	12641.8391				

Table **A-2.** (continued).

Constituent[a]	Predicted Concentration in Leachate[b] (mg/L)	Compatible Concentration For **IIDPE** (mg/L)	Compatible Concentration **for** GCL (mg/L)	Compatible Concentration for Clay (mg/L)	Suggested Maximum Leachate Concentration[c] (mg/L)
Terbium	2.3867				
Thallium	0.0037				
Va-dium	3.5063	500,000[d]		[e]	500,000
Ytterbium	**0.8124**				
Zinc	12.9486	500,000"			500,000
Zirconium	0.1151				
Total Inorganic	18367.1936				

a. Constituent reported in the "**INEEL CERCLA** Disposal Facility Design Inventory (EDF-ER-264)

b. Predicted leachate concentration in the first year of the ICDF landfill operation (EDF-ER-274).

c. **The** suggested maximum concentration selected **for** the ICDF liner system **is** bascd on the lowest of the concentrations listed for HDPE, GCL, and **clay** materials and are applicable **for** the leachate in **the** landfill and the waste **liquids** in the evaporation ponds.

d. From manufacturer specifications.

e. From manufacturer specifications.

Table A-3. Suggested maximum leachate concentrations for radionuclide constituents for liner compatibility in the ICDF Evaporation Pond

Constituent[a]	Predicted Activity Concentration in Leachate[b] (pCi/L)	Suggested Maximum Activity Concentration[c] (pCi/L)
Ac225	1.1E-07	2.4E+06
Ac227	4.5E-05	1.8E+08
Ac228	3.4E-10	1.0E+07
Ag106	0.0E+00	2.3E+07
Ag108	4.1E-08	
Ag108m	8.9E+00	8.7E+06
Ag109m	5.5E-11	1.6E+08
AgllO	5.7E-10	1.2E+07
Ag110m	6.2E-08	5.1E+06
Agl11	0.0E+00	
Am241	7.0E+01	2.6E+06
Am242	1.3E-04	7.4E+07
Am242m	1.3E-04	2.2E+08
Am243	9.8E-04	2.7E+06
Am245	0.0E+00	-
Am246	4.1E-25	1.1E+07
At217	8.5E-04	2.0E+06
Ba136m	0.0E+00	-
Ba137m	4.6E+05	2.1E+07
Ba140	0.0E+00	-
Be10	4.6E-06	7.0E+07
Bi210	1.1E-05	3.7E+07
Bi211	1.8E-04	2.2E+06
Bi212	5.5E-03	5.0E+06
Bi213	0.0E+00	-
Bi214	5.6E-05	6.6E+06
Bk249	5.4E-22	4.3E+08
Bk250	1.9E-26	1.2E+07
C14	9.1E-03	2.9E+08
Cd109	8.1E-10	7.2E+08
Cd113m	2.7E+02	7.7E+07
Cd115m	7.0E-52	2.3E+07
Ce141	3.6E-71	5.8E+07
Ce142	0.0E+00	-
Ce144	3.6E-03	1.3E+08
Cf249	8.1E-16	2.3E+06
Cf250	4.1E-16	2.4E+06
Cf251	1.9E-18	2.4E+06
Cf252	4.4E-20	1.4E+09
Cm241	3.2E-81	8.3E+07
Cm242	1.3E-17	2.3E+06
Cm243	8.9E-07	2.3E+06
Cm244	4.5E-04	2.4E+06
Cm245	2.0E-08	2.6E+06
Cm246	4.5E-10	2.6E+06
Cm247	1.6E-16	2.7E+06
Cm248	4.9E-17	3.1E+06
Cm250	1.4E-25	1.1E+07
Co-57	3.7E-01	9.9E+07
Co-58	5.8E-15	1.5E+07

Table A-3. (continued).

Constituent[a]	Predicted Activity Concentration in Leachate[b] (pCi/L)	Suggested Maximum Activity Concentration' (pCi/L)
Co-60	1.9E+04	5.5E+06
Cr-51	7.7E-53	3.9E+08
Cs132	0.0E+00	
Cs134	2.2E+01	8.3E+06
Cs135	7.2E-02	2.5E+08
Cs136	0.0E+00	-
Cs137	4.9E+04	8.3E+07
Er169	0.0E+00	-
Eu150	5.1E-08	4.9E+07
Eu152	2.8E+03	1.1E+07
Eu154	2.4E+03	9.3E+06
Eu155	5.2E+02	1.2E+08
Eu156	0.0E+00	-
Fe-59	2.0E-34	1.1E+07
Fr221	1.0E-07	2.2E+06
Fr223	5.6E-07	3.3E+07
Gd152	1.1E-13	6.6E+06
Gd153	8.4E-11	9.3E+07
H 3	8.3E+05	2.5E+09
Hf-181	1.7E-36	1.9E+07
Ho166m	1.1E-05	8.2E+06
I129	2.2E+04	1.8E+08
I131	0.0E+00	-
In114	4.8E-54	1.8E+07
In114m	5.1E-54	5.9E+07
In115	1.5E-11	9.3E+07
In115m	0.0E+00	
K-40	1.3E+02	2.3E+07
Kr81[d]	8.8E-05	
Kr85[d]	1.9E+07	
La138	0.0E+00	
La140	2.2E-105	5.0E+06
Mn-54	3.9E-07	1.7E+07
Nb92	6.3E-18	9.4E+06
Nb93m	1.3E-01	4.7E+08
Nb94	8.8E-05	8.3E+06
Nb95	4.8E-32	1.8E+07
Nb95m	1.8E-34	5.8E+07
Nd144	1.4E-09	7.5E+06
Nd147	0.0E+00	
Np235	8.4E-09	1.4E+09
Np236	8.6E-06	4.2E+07
Np237	8.0E+01	2.9E+06
Np238	2.7E-05	1.8E+07
Np239	4.1E-02	3.4E+07
Np240	3.5E-12	8.9E+06
Np240m	3.1E-09	1.5E+07
Pa231	1.3E-04	2.6E+06
Pa233	7.9E-02	3.5E+07
Pa234	5.0E-06	5.8E+06
Pa234m	3.1E-03	1.7E+07
Pb209	4.8E-07	7.2E+07

Table A-3. (continued).

Constituent[a]	Predicted Activity Concentration in Leachate[b] (pCi/L)	Suggested Maximum Activity Concentration' (pCi/L)
Pb210	I.1E-05	3.7E+08
Pb211	1.8E-04	2.8E+07
Pb212	5.5E-03	4.4E+07
Pb214	5.6E-05	2.6E+07
Pd107	I. 1E-01	4.3E+08
Pm146	2.4E-02	1.7E+07
Pm147	1.6E+03	2.3E+08
Pm148	1.7E-58	1.1E+07
Pm148m	3.4E-57	6.6E+06
Po210	6.8E-06	2.7E+06
Po211	4.6E-09	1.9E+06
Po212	2.2E-03	1.6E+06
Po213	2.9E-07	1.7E+06
Po214	3.7E-05	1.8E+06
Po215	1.2E-04	1.9E+06
Po216	3.7E-03	2.1E+06
Po218	3.7E-05	2.4E+06
Pr143	0.0E+00	-
Pr144	7.4E-03	1.1E+07
Pr144m	1.1E-04	1.2E+09
Pu236	3.9E-05	2.5E+06
Pu237	8.6E-58	2.3E+08
Pu238	1.7E+03	2.6E+06
Pu239	4.8E+01	2.8E+06
Pu240	1.1E+01	2.8E+06
P 3 4 1	4.6E+02	2.7E+09
Pu242	1.7E-03	2.9E+06
P 3 4 3	4.6E-15	7.3E+07
Pu244	1.8E-10	3.1E+06
Pu246	9.9E-25	9.2E+07
Ra222	1.2E-115	2.2E+06
Ra223	2.0E-04	2.4E+06
Ra224	5.5E-03	2.5E+06
Ra225	5.1E-07	1.2E+08
Ra226	4.7E+00	3.0E+06
Ra228	1.5E-09	1.2E+09
Rb86	0.0E+00	-
Rb87	2.0E-04	1.8E+08
Rh102	5.7E-04	1.8E+08
Rh103m	5.4E-57	3.7E+08
Rh106	2.2E-01	8.8E+06
Rn218	2.1E-112	2.0E+06
Rn219	3.4E-01	2.1E+06
Rn220	9.2E+00	2.3E+06
Rn222	1.0E-01	2.6E+06
Ru103	3.6E-28	2.6E+07
Ru106	2.2E-01	3.6E+08
Sb124	4.1E-39	6.3E+06
Sb125	1.9E+02	2.7E+07
Sb126	4.1E-01	4.7E+06
Sb126m	2.9E+00	6.6E+06
Sc-46	9.2E-20	6.7E+06

Table **A-3.** (continued).

Constituent'	Predicted Activity Concentration in Leachate[b] (pCi/L)	**Suggested** Maximum Activity Concentration' (pCi/L)
Se 79	4.1E+01	2.7E+08
Sm146	1.8E-09	5.6E+06
Sm147	1.7E-05	6.3E+06
Sm148	4.2E-12	7.1E+06
Sm149[e]	2.1E-11	
Sm151	1.4E+03	7.2E+08
Sn117m	0.0E+00	
Sn119m	1.1E-06	7.2E+08
Sn121m	2.1E-01	1.6E+08
Sn123	6.5E-16	4.7E+09
Sn125	0.0E+00	-
Sn126	1.1E+00	2.7E+07
Sr89	5.0E-42	4.0E+07
Sr90	1.9E+06	2.4E+07
Tb160	1.3E-33	2.6E+07
Tb161	0.0E+00	-
Tc 98	6.8E-04	1.1E+07
Tc 99	2.2E+04	9.4E+06
Te123	3.6E-14	1.7E+08
Te123m	2.4E-22	8.3E+08
Te125m	1.8E+01	5.8E+07
Te127	7.5E-19	8.9E+07
Te127m	7.6E-19	6.2E+07
Te129	5.4E-70	1.6E+08
Te129m	8.6E-70	2.4E+07
Th226	2.2E-116	4.6E+07
Th227	1.8E-04	2.2E+06
Th228	3.3E-01	2.3E+06
Th229	5.1E-07	2.6E+06
Th230	1.7E+00	2.8E+06
Th231	1.6E+00	3.0E+06
Th232	1.6E+00	8.0E+07
Th234	1.7E-02	3.5E+06
Tl207	1.8E-04	2.1E+08
Tl208	2.0E-03	2.9E+07
Tl209	1.1E-08	3.6E+06
Tm170	2.7E-25	3.6E+06
Tm171	6.6E-12	4.2E+07
U230	0.0E+00	-
U232	8.8E-02	5.4E+08
U233	4.2E-03	2.7E+06
U234	9.9E+02	2.9E+06
U235	1.8E+01	3.0E+06
U236	3.3E+01	3.1E+06
U237	0.0E+00	
U238	3.2E+02	3.2E+06
U240	4.2E-09	3.4E+06
Xe127	2.6E-68	8.9E+07
Xe129m	0.0E+00	
Xe131m	4.5E-108	4.6E+07
Xe133	0.0E+00	
Y90	1.3E+05	8.8E+07

Table A-3. (continued).

Constituent[a]	Predicted Activity Concentration in Leachate[b] (pCi/L)	Suggested Maximum Activity concentration[c] (pCi/L)
Y91	2.4E-36	1.5E+07
Zn65	1.7E-07	2.3E+07
Zr93	1.4E+00	2.4E+07
Zr95	4.9E-25	7.3E+08

Notes:

a. Constituent reported in the "INEEL CERCLA Disposal Facility Design Inventory (EDF-ER-264)

b. Predicted average leachate activity concentration during the 15 year operational period.

c. The suggested maximum activity concentration selected for the ICDF liner system is based on a total absorbed dose of 1,000,000 rads for the individual constituent and a 36 cm liquid waste depth.

d. The constituents *are* gaseous elements so not part of the leachate.

e Stable isotope.

Appendix B

ICDF Evaporation Pond WAC Comparison Table

Table B-1. Maximum Allowable Evaporation Pond Liquid Concentration.

Constituent	Pond Liner Maximum Concentrations[a]	Regulatory limitations	ICDF Evaporation Pond WAC	Source of ICDF Evaporation Pond WAC
Radiological pCi/L				
Ac225	2.4E+06	No Limit	2.4E+06	Pond Liner
Ac227	1.8E+08	No Limit	1.8E+08	Pond Liner
Ac228	1.0E+07	No Limit	1.0E+07	Pond Liner
Ag106	2.3E+07	No Limit	2.3E+07	Pond Liner
Ag108	Did not leach[b]	No Limit	No Limit	No Limit
Ag108m	8.7E+06	No Limit	8.7E+06	Pond Liner
Ag109m	1.6E+08	No Limit	1.6E+08	Pond Liner
AgllO	1.2E+07	No Limit	1.2E+07	Pond Liner
AgllOm	5.1E+06	No Limit	5.1E+06	Pond Liner
Ag111	Did not leach[b]	No Limit	No Limit	No Limit
Am241	2.6E+06	1.0E+07	2.6E+06	Pond Liner
Am242	7.4E+07	No Limit	7.4E+07	Pond Liner
Am242m	2.2E+08	No Limit	2.2E+08	Pond Liner
Am243	2.7E+06	1.0E+07	2.7E+06	Pond Liner
Am245	Did not leach[b]	No Limit	No Limit	No Limit
Am246	1.1E+07	No Limit	1.1E+07	Pond Liner
At217	2.0E+06	No Limit	2.0E+06	Pond Liner
Ba136m	Did not leach[b]	No Limit	No Limit	No Limit
Ba137m	2.1E+07	No Limit	2.1E+07	Pond Liner
Ba140	Did not leach[b]	No Limit	No Limit	No Limit
Be 10	7.0E+07	No Limit	7.0E+07	Pond Liner
Bi210	3.7E+07	No Limit	3.7E+07	Pond Liner
Bi211	2.2E+06	No Limit	2.2E+06	Pond Liner
Bi212	5.0E+06	No Limit	5.0E+06	Pond Liner
Bi213	Did not leach[b]	No Limit	No Limit	No Limit
Bi214	6.6E+06	No Limit	6.6E+06	Pond Liner
Bk249	4.3E+08	No Limit	4.3E+08	Pond Liner
Bk250	1.2E+07	No Limit	1.2E+07	Pond Liner
C 14	2.9E+08	No Limit	2.9E+08	Pond Liner
Cd109	7.2E+08	No Limit	7.2E+08	Pond Liner
Cd113m	7.7E+07	No Limit	7.7E+07	Pond Liner
Cd115m	2.3E+07	No Limit	2.3E+07	Pond Liner
Ce141	5.8E+07	No Limit	5.8E+07	Pond Liner
Ce142	Did not leach[b]	No Limit	No Limit	No Limit
Ce144	1.3E+08	No Limit	1.3E+08	Pond Liner
Cf249	2.3E+06	1.0E+07	2.3E+06	Pond Liner
Cf250	2.4E+06	No Limit	2.4E+06	Pond Liner
Cf251	2.4E+06	1.0E+07	2.4E+06	Pond Liner
Cf252	1.4E+09	No Limit	1.4E+09	Pond Liner
Cm241	8.3E+07	No Limit	8.3E+07	Pond Liner
Cm242	2.3E+06	2.0E-02	2.0E-02	Other Reg.
Cm243	2.3E+06	1.0E+07	2.3E+06	Pond Liner
Cm244	2.4E+06	1.0E+07	2.4E+06	Pond Liner
Cm245	2.6E+06	1.0E+07	2.6E+06	Pond Liner
Cm246	2.6E+06	1.0E+07	2.6E+06	Pond Liner
Cm247	2.7E+06	1.0E+07	2.7E+06	Pond Liner
Cm248	3.1E+06	1.0E+07	3.1E+06	Pond Liner

Table B-1. (continued).

Constituent	Pond Liner Maximum Concentrations[a]	Regulatory limitations	ICDF Evaporation Pond WAC	Source of ICDF Evaporation Pond WAC
Co-57	9.9E+07	No Limit	9.9E+07	Pond Liner
CO-58	1.5E+07	No Limit	1.5E+07	Pond Liner
Co-60	5.5E+06	No Limit	5.5E+06	Pond Liner
Cr-51	3.9E+08	No Limit	3.9E+08	Pond Liner
Cs132	Did not leach[b]	No Limit	No Limit	No Limit
Cs134	8.3E+06	No Limit	8.3E+06	Pond Liner
Cs135	2.5E+08	No Limit	2.5E+08	Pond Liner
Cs136	Did not leach[b]	No Limit	No Limit	No Limit
Cs137	8.3E+07	No Limit	8.3E+07	Pond Liner
Er169	Did not leach[b]	No Limit	No Limit	No Limit
Eu150	4.9E+07	No Limit	4.9E+07	Pond Liner
Eu152	1.1E+07	No Limit	1.1E+07	Pond Liner
Eu154	9.3E+06	No Limit	9.3E+06	Pond Liner
Eu155	1.2E+08	No Limit	1.2E+08	Pond Liner
Eu156	Did not leach[b]	No Limit	No Limit	No Limit
Fe-59	1.1E+07	No Limit	1.1E+07	Pond Liner
Fr221	2.2E+06	No Limit	2.2E+06	Pond Liner
Fr223	3.3E+07	No Limit	3.3E+07	Pond Liner
Gd152	6.6E+06	No Limit	6.6E+06	Pond Liner
Gd153	9.3E+07	No Limit	9.3E+07	Pond Liner
H 3	2.5E+09	No Limit	2.5E+09	Pond Liner
Hf-181	1.9E+07	No Limit	1.9E+07	Pond Liner
Ho166m	8.2E+06	No Limit	8.2E+06	Pond Liner
I129	1.8E+08	No Limit	1.8E+08	Pond Liner
I131	Did not leach[b]	No Limit	No Limit	No Limit
In114	1.8E+07	No Limit	1.8E+07	Pond Liner
In114m	5.9E+07	No Limit	5.9E+07	Pond Liner
In115	9.3E+07	No Limit	9.3E+07	Pond Liner
In115m	Did not leach[b]	No Limit	No Limit	No Limit
K-40	2.3E+07	No Limit	2.3E+07	Pond Liner
Kr81	Did not leach[b]	No Limit	No Limit	No Limit
Kr85	Did not leach[b]	No Limit	No Limit	No Limit
La138	Did not leach[b]	No Limit	No Limit	No Limit
La140	5.0E+06	No Limit	5.0E+06	Pond Liner
Mn-54	1.7E+07	No Limit	1.7E+07	Fond Liner
Nb92	9.4E+06	No Limit	9.4E+06	Pond Liner
Nb93m	4.7E+08	No Limit	4.7E+08	Pond Liner
Nb94	8.3E+06	No Limit	8.3E+06	Pond Liner
Nb95	1.8E+07	No Limit	1.8E+07	Pond Liner
Nb95m	5.8E+07	No Limit	5.8E+07	Pond Liner
Nd144	7.5E+06	No Limit	7.5E+06	Pond Liner
Nd147	Did not leach[b]	No Limit	No Limit	No Limit
Np235	1.4E+09	No Limit	1.4E+09	Pond Liner
Np236	4.2E+07	No Limit	4.2E+07	Pond Liner
Np237	2.9E+06	1.0E+07	2.9E+06	Pond Liner
Np238	1.8E+07	No Limit	1.8E+07	Pond Liner
Np239	3.4E+07	No Limit	3.4E+07	Pond Liner
Np240	8.9E+06	No Limit	8.9E+06	Pond Liner
Np240m	1.5E+07	No Limit	1.5E+07	Pond Liner
Pa231	2.6E+06	No Limit	2.6E+06	Pond Liner
Pa233	3.5E+07	No Limit	3.5E+07	Pond Liner
Pa234	5.8E+06	No Limit	5.8E+06	Pond Liner
Pa234m	1.7E+07	No Limit	1.7E+07	Pond Liner

Table B-1. (continued).

Constituent	Pond Liner Maximum Concentrations[a]	Regulatory limitations	ICDF Evaporation Pond WAC	Source of ICDF Evaporation Pond WAC
Pb210	3.7E+08	No Limit	3.7E+08	Pond Liner
Pb211	2.8E+07	No Limit	2.8E+07	Pond Liner
Pb212	4.4E+07	No Limit	4.4E+07	Pond Liner
Pb214	2.6E+07	No Limit	2.6E+07	Fond Liner
Pd107	4.3E+08	No Limit	4.3E+08	Pond Liner
Pm146	1.7E+07	No Limit	1.7E+07	Pond Liner
Pm147	2.3E+08	No Limit	2.3E+08	Pond Liner
Pm148	1.1E+07	No Limit	1.1E+07	Pond Liner
Pm148m	6.6E+06	No Limit	6.6E+06	Pond Liner
Po210	2.7E+06	No Limit	2.7E+06	Pond Liner
Po211	1.9E+06	No Limit	1.9E+06	Pond Liner
Po212	1.6E+06	No Limit	1.6E+06	Pond Liner
Po213	1.7E+06	No Limit	1.7E+06	Pond Liner
Po214	1.8E+06	No Limit	1.8E+06	Pond Liner
Po215	1.9E+06	No Limit	1.9E+06	Pond Liner
Po216	2.1E+06	No Limit	2.1E+06	Pond Liner
Po218	2.4E+06	No Limit	2.4E+06	Pond Liner
Pr143	Did not leach[b]	No Limit	No Limit	No Limit
Pr144	1.1E+07	No Limit	1.1E+07	Pond Liner
Pr144m	1.2E+09	No Limit	1.2E+09	Pond Liner
Pu236	2.5E+06	No Limit	2.5E+06	Pond Liner
Pu237	2.3E+08	No Limit	2.3E+08	Pond Liner
Pu238	2.6E+06	1.0E+07	2.6E+06	Pond Liner
Pu239	2.8E+06	1.0E+07	2.8E+06	Pond Liner
Pu240	2.8E+06	1.0E+07	2.8E+06	Pond Liner
Pu241	2.7E+09	No Limit	2.7E+09	Pond Liner
Pu242	2.9E+06	1.0E+07	2.9E+06	Pond Liner
Pu243	7.3E+07	No Limit	7.3E+07	Pond Liner
Pu244	3.1E+06	1.0E+07	3.1E+06	Pond Liner
Pu246	9.2E+07	No Limit	9.2E+07	Pond Liner
Ra222	2.2E+06	No Limit	2.2E+06	Pond Liner
Ra223	2.4E+06	No Limit	2.4E+06	Pond Liner
Ra224	2.5E+06	No Limit	2.5E+06	Pond Liner
Ra225	1.2E+08	No Limit	1.2E+08	Pond Liner
Ra226	3.0E+06	No Limit	3.0E+06	Pond Liner
Ra228	1.2E+09	No Limit	1.2E+09	Pond Liner
Rb86	Did not leach[b]	No Limit	No Limit	No Limit
Rb87	1.8E+08	No Limit	1.8E+08	Pond Liner
Rh102	1.8E+08	No Limit	1.8E+08	Pond Liner
Rh103m	3.7E+08	No Limit	3.7E+08	Pond Liner
Rh106	8.8E+06	No Limit	8.8E+06	Pond Liner
Rn218	2.0E+06	No Limit	2.0E+06	Fond Liner
Rn219	2.1E+06	No Limit	2.1E+06	Pond Liner
Rn220	2.3E+06	No Limit	2.3E+06	Pond Liner
Rn222	2.6E+06	No Limit	2.6E+06	Pond Liner
Ru103	2.6E+07	No Limit	2.6E+07	Pond Liner
Ru106	3.6E+08	No Limit	3.6E+08	Pond Liner
Sb124	6.3E+06	No Limit	6.3E+06	Pond Liner
Sb125	2.7E+07	No Limit	2.7E+07	Pond Liner
Sb126	4.7E+06	No Limit	4.7E+06	Pond Liner
Sb126m	6.6E+06	No Limit	6.6E+06	Pond Liner
Sc-46	6.7E+06	No Limit	6.7E+06	Pond Liner
Se 79	2.7E+08	No Limit	2.7E+08	Pond Liner
Sm146	5.6E+06	No Limit	5.6E+06	Pond Liner
Sm147	6.3E+06	No Limit	6.3E+06	Pond Liner
Sm148	7.1E+06	No Limit	7.1E+06	Pond Liner
Sm149	Did not leach[b]	No Limit	No Limit	No Limit
Sm151	7.2E+08	No Limit	7.2E+08	Pond Liner
Sn117m	Did not leach[b]	No Limit	No Limit	No Limit

Table B-1. (continued).

Constituent	Pond Liner Maximum Concentrations'	Regulatory limitations	ICDF Evaporation Pond WAC	Source of ICDF Evaporation Pond WAC
Sn121m	1.6E+08	No Limit	1.6E+08	Pond Liner
Sn123	4.7E+09	No Limit	4.7E+09	Pond Liner
Sn125	Did not leach[b]	No Limit	No Limit	No Limit
Sn126	2.7E+07	No Limit	2.7E+07	Pond Liner
Sr89	4.0E+07	No Limit	4.0E+07	Pond Liner
Sr90	2.4E+07	No Limit	2.4E+07	Pond Liner
Tb160	2.6E+07	No Limit	2.6E+07	Pond Liner
Tb161	Did not leach[b]	No Limit	No Limit	No Limit
Tc 98	1.1E+07	No Limit	1.1E+07	Pond Liner
Tc 99	9.4E+06	No Limit	9.4E+06	Pond Liner
Te123	1.7E+08	No Limit	1.7E+08	Pond Liner
Te123m	8.3E+08	No Limit	8.3E+08	Pond Liner
Te125m	5.8E+07	No Limit	5.8E+07	Pond Liner
Te127	8.9E+07	No Limit	8.9E+07	Pond Liner
Te127m	6.2E+07	No Limit	6.2E+07	Pond Liner
Te129	1.6E+08	No Limit	1.6E+08	Pond Liner
Te129m	2.4E+07	No Limit	2.4E+07	Pond Liner
Th226	4.6E+07	No Limit	4.6E+07	Pond Liner
Th227	2.2E+06	No Limit	2.2E+06	Pond Liner
Th228	2.3E+06	No Limit	2.3E+06	Pond Liner
Th229	2.6E+06	No Limit	2.6E+06	Pond Liner
Th230	2.8E+06	No Limit	2.8E+06	Pond Liner
Th231	3.0E+06	No Limit	3.0E+06	Pond Liner
Th232	8.0E+07	No Limit	8.0E+07	Pond Liner
Th234	3.5E+06	No Limit	3.5E+06	Pond Liner
Tl207	2.1E+08	No Limit	2.1E+08	Pond Liner
Tl208	2.9E+07	No Limit	2.9E+07	Pond Liner
Tl209	3.6E+06	No Limit	3.6E+06	Pond Liner
Tm170	3.6E+06	No Limit	3.6E+06	Pond Liner
Tm171	4.2E+07	No Limit	4.2E+07	Pond Liner
U230	Did not leach[b]	No Limit	No Limit	No Limit
U232	5.4E+08	No Limit	5.4E+08	Pond Liner
U233	2.7E+06	No Limit	2.7E+06	Pond Liner
U234	2.9E+06	No Limit	2.9E+06	Pond Liner
U235	3.0E+06	No Limit	3.0E+06	Pond Liner
U236	3.1E+06	No Limit	3.1E+06	Pond Liner
U237	Did not leach[b]	No Limit	No Limit	No Limit
U238	3.2E+06	No Limit	3.2E+06	Fond Liner
U240	3.4E+06	No Limit	3.4E+06	Pond Liner
Xe127	8.9E+07	No Limit	8.9E+07	Pond Liner
Xe129m	Did not leach[b]	No Limit	No Limit	No Limit
Xe131m	4.6E+07	No Limit	4.6E+07	Pond Liner
Xe133	Did not leach[b]	No Limit	No Limit	No Limit
Y90	8.8E+07	No Limit	8.8E+07	Pond Liner
Y91	1.5E+07	No Limit	1.5E+07	Pond Liner
Zn65	2.3E+07	No Limit	2.3E+07	Pond Liner
Zr93	2.4E+07	No Limit	2.4E+07	Pond Liner
Zr95	7.3E+08	No Limit	7.3E+08	Pond Liner
Organic (mg/L)				
1,1,1-Trichloroethane	2.0E+01	5.0E+02	2.0E+01	Pond Liner
1,1,2,2-Tetrachloroethane	5.0E+05	5.0E+02	5.0E+02	40 CFR Subpart CC
1,1,2-Trichloroethane	5.0E+05	5.0E+02	5.0E+02	40 CFR Subpart CC
1,1-Dichloroethane	5.0E+05	5.0E+02	5.0E+02	40 CFR Subpart CC
1,1-Dichloroethene	5.0E+05	5.0E+02	5.0E+02	40 CFR Subpart CC
1,2,4-Trichlorobenzene	5.0E+05	5.0E+02	5.0E+02	40 CFR Subpan CC
1.2-Dichlorobenzene	5.0E+05	5.0E+02	5.0E+02	40 CFR Subpan CC
t,2-Dichloroethane	5.0E+05	5.0E+02	5.0E+02	40 CFR Subpart CC
1,2-Dichloroethene (total)	5.0E+05	5.0E+02	5.0E+02	40 CFR Subpan CC
1.3-Dichlorobenzene	2.0E+03	5.0E+02	5.0E+02	40 CFR Subpart CC
1,4-Dichlorobenzene	5.0E+05	5.0E+02	5.0E+02	40 CFR Subpart CC
1,4-Dioxane	5.0E+05	5.0E+02	5.0E+02	40 CFR Subpart CC
2,4,5-Trichlorophenol	5.0E+05	1.0E+04	1.0E+04	40 CFR Subpart BB
2,4,6-Trichlorophenol	5.0E+05	1.0E+04	1.0E+04	40 CFR Subpart BB
2,4-Dichlorophenol	5.0E+05	1.0E+04	1.0E+04	40 CFR Subpan BB
2,4-Dimethylphenol	5.0E+05	1.0E+04	1.0E+04	40 CFR Subpan BB

Table B-1. (continued).

Constituent	Pond Liner Maximum Concentrations"	Regulatory limitations	ICDF Evaporation Pond WAC	Source of ICDF Evaporation Pond WAC
2,4-Dinitrotoluene	5.0E+05	1.0E+04	1.0E+04	40 CFR Suboart BB
2,6-Dinitrotoluene	5.0E+05	1.0E+04	1.0E+04	40 CFR Subpart BB
2-Butanone	2.0E+05	5.0E+02	5.0E+02	40 CFR Subpart CC
2-Chlom-phthalene	2.0E+03	1.0E+04	2.0E+03	Pond Liner
2-Chlorophenol	2.0E+03	1.0E+04	2.0E+03	Pond Liner
2-Hexanone	5.0E+05	5.0E+02	5.0E+02	40 CFR Subpart CC
2-Methyl-phthalene	5.0E+05	1.0E+04	1.0E+04	40 CFR Subpart BB
2-Methylphenol	5.0E+05	1.0E+04	1.0E+04	40 CFR Subpart BB
2-Nitroaniline	5.0E+05	1.0E+04	1.0E+04	40 CFR Subpart BB
2-Nitrophenol	5.0E+05	1.0E+04	1.0E+04	40 CFR Subpart BB
3,3'-Dichlorobenzidine	5.0E+05	1.0E+04	1.0E+04	40 CFR Subpan BB
3-Methyl Buta-1	5.0E+05	1.0E+04	1.0E+04	40 CFR Subpart BB
3-Nitroaniline	5.0E+05	1.0E+04	1.0E+04	40 CFR Subpart BB
4,6-Dinitro-2-methylphenol	5.0E+05	1.0E+04	1.0E+04	40 CFR Subpan BB
4-Bromophenyl-phenylether	2.0E+03	1.0E+04	2.0E+03	40 CFR Subpart BB
4-Chloro-3-methylphenol	5.0E+05	1.0E+04	1.0E+04	40 CFR Subpart BB
4-Chloroaniline	5.0E+05	1.0E+04	1.0E+04	40 CFR Subpart BB
4-Chlorophenyl-phenylether	5.0E+05	1.0E+04	1.0E+04	40 CFR Subpart BB
4-Methyl-2-Penranone	5.0E+05	5.0E+02	5.0E+02	40 CFR Subpart CC
4-Methylphenol	5.0E+05	1.0E+04	1.0E+04	40 CFR Subpart BB
4-Nitroaniline	5.0E+05	1.0E+04	1.0E+04	40 CFR Subpart BB
4-Niaophenol	5.0E+05	1.0E+04	1.0E+04	40 CFR Subpart BB
Ace-pbthene	2.0E+03	1.0E+04	2.0E+03	40 CFR Subpart BB
Ace-phthylene	2.0E+03	1.0E+04	2.0E+03	40 CFR Subpart BB
Acetone	2.0E+05	5.0E+02	5.0E+02	40 CFR Subpart CC
Acetonitrile	5.0E+05	5.0E+02	5.0E+02	40 CFR Subpart CC
Acrolein	2.0E+05	5.0E+02	5.0E+02	40 CFR Subpart CC
Acrylonitrile	2.0E+05	5.0E+02	5.0E+02	40 CFR Subpan CC
Anthracene	2.0E+03	1.0E+04	2.0E+03	40 CFR Subpart BB
Aramite	5.0E+05	1.0E+04	1.0E+04	40 CFR Subpart BB
Aroclor-1016	5.0E+05	0.0E+00	0.0E+00	Other Reg
Aroclor-1254	5.0E+05	0.0E+00	0.0E+00	Other Reg
Aroclor-1260	5.0E+05	0.0E+00	0.0E+00	Other Reg
Aroclor-1268	5.0E+05	0.0E+00	0.0E+00	Other Reg
Benzene	2.0E+03	5.0E+02	5.0E+02	40 CFR Subpart CC
Benzidine	2.0E+05	1.0E+04	1.0E+04	40 CFR Subpart BB
Benzo(a)anthracene	2.0E+03	1.0E+04	2.0E+03	Pond Liner
Benzo(a)pyrene	2.0E+03	1.0E+04	2.0E+03	Pond Liner
Benzo(b)fluoranthene	2.0E+03	1.0E+04	2.0E+03	Pond Liner
Benzo(g,h,i)perylene	5.0E+05	1.0E+04	1.0E+04	40 CFR Subpart BB
Benzo(k)fluoranthene	5.0E+05	1.0E+04	1.0E+04	40 CFR Subpart BB
Benzoic acid	5.0E+05	l.OE-W	1.0E+04	40 CFR Subpart BB
bis(2-Chloroethoxy)methane	2.0E+03	1.0E+04	2.0E+03	Fond Liner
bis(2-Chloroethyl)ether	2.0E+03	1.0E+04	2.0E+03	Pond Liner
bis(2-Chloroisopropyl)ether	2.0E+03	1.0E+04	2.0E+03	Pond Liner
bis(2-Ethylhexyl)phthalate	2.0E+03	1.0E+04	2.0E+03	Pond Liner
Butane,1,1,3,4-Tetrachloro-	5.0E+05	1.0E+04	1.0E+04	40 CFR Subpart BB
Butylbenzylphthalate	2.0E+05	1.0E+04	1.0E+04	40 CFR Subpart BB
Carbazole	5.0E+05	1.0E+04	1.0E+04	do CFR Subpart BB
Carbon Disulfide	5.0E+05	5.0E+02	5.0E+02	do CFR Subpart CC
Chlorobenzene	2.0E+03	5.0E+02	5.0E+02	40 CFR Subpart CC
Chloroethane	5.0E+05	5.0E+02	5.0E+02	40 CFR Subpart CC
Chloromethane	2.0E+03	5.0E+02	5.0E+02	40 CFR Subpart CC
Chrysene	2.0E+03	1.0E+04	2.0E+03	Pond Liner
Decane,3,4-Dimethyl	5.0E+05	1.0E+04	1.0E+04	40 CFR Subpart BB
Diacetone alcohol	5.0E+05	1.0E+04	1.0E+04	40 CFR Subpart BB
Dibenz(a,h)anthracene	2.0E+03	1.0E+04	2.0E+03	Pond Liner
Dibenzofuran	5.0E+05	1.0E+04	1.0E+04	40 CFR Subpart BB
Diethylphthalate	1.0E+05	1.0E+04	1.0E+04	40 CFR Subpart BB
Dimethyl Disulfide	5.0E+05	1.0E+04	1.0E+04	40 CFR Subpan BB
Dimethylphthalate	1.0E+05	1.0E+04	1.0E+04	40 CFR Subpart BB
Di-n-butylphthalate	1.0E+05	1.0E+04	1.0E+04	40 CFR Subpart BB
Di-n-octylphthalate	5.0E+05	1.0E+04	1.0E+04	40 CFR Subpart BB
Eicosane	5.0E+05	1.0E+04	1.0E+04	40 CFR Subpart BB
Ethyl cyanide	5.0E+05	1.0E+04	1.0E+04	40 CFR Subpart BB
Ethylbenzene	2.0E+03	5.0E+02	5.0E+02	40 CFR Subpart CC
Famphur	5.0E+05	1.0E+04	1.0E+04	40 CFR Subpart BB
Fluoranthene	2.0E+03	1.0E+04	2.0E+03	Pond Liner
Fluorene	2.0E+03	1.0E+04	2.0E+03	Pond Liner
Hepradecane,2,6,10,15-Tetra	5.0E+05	1.0E+04	1.0E+04	40 CFR Subpart BB

Table B-1. (continued).

Constituent	Pond Liner Maximum Concentrations'	Regulatory limitations	ICDF Evaporation Pond WAC	Source of ICDF Evaporation Pond WAC
Hexachloroethane	2.0E+03	5.0E+02	5.0E+02	40 CFR Subpart CC
Indeno(1,2,3-cd)pyrene	2.0E+03	1.0E+04	2.0E+03	Pond Liner
Isobutyl alcohol	5.0E+05	5.0E+02	5.0E+02	40 CFR Subpan CC
Isophomne	2.0E+03	1.0E+04	2.0E+03	Pond Liner
Isopropyl Alcohol/2-propanol	5.0E+05	1.0E+04	1.0E+04	40 CFR Subpan BB
Kepone	5.0E+05	1.0E+04	1.0E+04	40 CFR Subpan BB
Mesityl oxide	5.0E+05	1.0E+04	1.0E+04	40 CFR Subpan BB
Methyl Acetate	5.0E+05	1.0E+04	1.0E+04	40 CFR Subpart BB
Methylene Chloride	2.0E+01	5.0E+02	2.0E+01	Pond Liner
-phthalene	2.0E+03	1.0E+04	2.0E+03	Pond Liner
Nitrobenzene	1.0E+05	5.0E+02	5.0E+02	40 CFR Subpan CC
N-Nitroso-di-n-propylamine	1.0E+05	1.0E+04	1.0E+04	40 CFR Subpart BB
N-Nitrosodiphenylamine	1.0E+05	1.0E+04	1.0E+04	40 CFR Subpart BB
Octane,2,3,7-Trimethyl	5.0E+05	1.0E+04	1.0E+04	40 CFR Subpart BB
o-Toluenesulfo-mide	5.0E+05	1.0E+04	1.0E+04	40 CFR Subpart BB
Pentachlorophenol	1.0E+05	1.0E+04	1.0E+04	40 CFR Subpart BB
Phe-nthrene	2.0E+03	1.0E+04	2.0E+03	Pond Liner
Phenol	1.0E+05	1.0E+04	1.0E+04	40 CFR Subpart BB
Phenol,2,6-Bis(1,1-Diethyl)	5.0E+05	1.0E+04	1.0E+04	40 CFR Subpart BB
p-Toluenesulfo-mide	5.0E+05	1.0E+04	1.0E+04	40 CFR Subpart CC
Pyrene	2.0E+03	1.0E+04	2.0E+03	Pond Liner
RDX	5.0E+03	1.0E+04	5.0E+03	Pond Liner
Styrene	2.0E+03	1.0E+04	2.0E+03	Pond Liner
Tetrachloroethene	2.0E+01	5.0E+02	2.0E+01	Pond Liner
Toluene	5.0E+05	5.0E+02	5.0E+02	40 CFR Subpart CC
Tributylphosphate	1.1E+03	1.0E+04	1.1E+03	Pond Liner
Trichloroethene	5.0E+05	5.0E+02	5.0E+02	40 CFR Subpart CC
Trinitrotoluene	5.0E+05	1.0E+04	1.0E+04	40 CFR Subpart BB
Undecane.4.6-Dimethyl-	5.0E+03	1.0E+04	5.0E+03	Pond Liner
Xylene (ortho)	5.0E+05	5.0E+02	5.0E+02	40 CFR Subpart CC
Xylene (total)	5.0E+05	5.0E+02	5.0E+02	40 CFR Subpart CC
RDX	5.0E+05	1.0E+04	1.0E+04	40 CFR Subpart BB
Trinitrotoluene	5.0E+05	1.0E+04	1.0E+04	40 CFR Subpart BB
Inorganic (mg/L)				
Aluminum	5.0E+05	No Limit	5.0E+05	Pond Liner
Antimony	5.0E+05	No Limit	5.0E+05	Pond Liner
Arsenic	5.0E+05	No Limit	5.0E+05	Pond Liner
Barium	5.0E+05	No Limit	5.0E+05	Pond Liner
Beryllium	5.0E+05	No Limit	5.0E+05	Pond Liner
Boron	5.0E+05	No Limit	5.0E+05	Pond Liner
Cadmium	5.0E+05	No Limit	5.0E+05	Pond Liner
Calcium	5.0E+05	No Limit	5.0E+05	Fond Liner
Chloride	5.0E+05	No Limit	5.0E+05	Pond Liner
chromium	5.0E+05	No Limit	5.0E+05	Pond Liner
Cobalt	5.0E+05	No Limit	5.0E+05	Pond Liner
Copper	5.0E+05	No Limit	5.0E+05	Pond Liner
Cyanide	5.0E+05	No Limit	5.0E+05	Pond Liner
Dysprosium	5.0E+05	No Limit	5.0E+05	Pond Liner
Fluoride	5.0E+05	No Limit	5.0E+05	Pond Liner
Iron	5.0E+05	No Limit	5.0E+05	Pond Liner
Lead	5.0E+05	No Limit	5.0E+05	Pond Liner
Magnesium	5.0E+05	No Limit	5.0E+05	Pond Liner
Manganese	5.0E+05	No Limit	5.0E+05	Pond Liner
Mercury	5.0E+05	No Limit	5.0E+05	Pond Liner
Molybdenum	5.0E+05	No Limit	5.0E+05	Pond Liner
Nickel	5.0E+05	No Limit	5.0E+05	Pond Liner
Nitrate	5.0E+05	No Limit	5.0E+05	Pond Liner
Nitrate/Nitrite-N	5.0E+05	No Limit	5.0E+05	Pond Liner
Nitrite	5.0E+05	No Limit	5.0E+05	Pond Liner
Phosphorus	5.0E+05	No Limit	5.0E+05	Pond Liner
Potassium	5.0E+05	No Limit	5.0E+05	Pond Liner
Selenium	5.0E+05	No Limit	5.0E+05	Pond Liner
Silver	5.0E+05	No Limit	5.0E+05	Pond Liner
Sodium	5.0E+05	No Limit	5.0E+05	Pond Liner
Strontium	5.0E+05	No Limit	5.0E+05	Pond Liner
Sulfate	5.0E+05	No Limit	5.0E+05	Pond Liner
Sulfide	5.0E+05	No Limit	5.0E+05	Pond Liner
Sulfur	5.0E+05	No Limit	5.0E+05	Pond Liner

Table B-1. (continued).

Constituent	Pond Liner Maximum Concentrations[a]	Regulatory limitations	ICDF Evaporation Pond WAC	Source of ICDF Evaporation Pond WAC
Thallium	5.0E+05	No Limit	5.0E+05	Pond Liner
Vanadium	5.0E+05	No Limit	5.0E+05	Pond Liner
Ytterbium	5.0E+05	No Limit	5.0E+05	Pond Liner
Zinc	5.0E+05	No Limit	5.0E+05	Pond Liner
Zirconium	5.0E+05	No Limit	5.0E+05	Pond Liner

a. For specific constituents not available in the liner compatibility literature from other sites, the total maximum concentration by chemical category (i.e., 500,000 ppm for organics and 500,000 ppm for inorganics should be used as per Table 4-1 in the main text.

b. For radiological constituents that are not expected due to their low solubility or other factors as described in EDF-ER-274, Leachate/Contaminant Reduction Time Study, there is no pond liner compatibility limit.